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UDC 581

Reasons for Delay in Cell Heat Stability Rise After Heat Shock

18400456c Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 305 No 6, Apr 89 (manuscript received 24 Aug 88) pp 1512-1514

[Article by V. Ya. Aleksandrov, T. V. Arkhipova, and I. G. Zavadskaya, Botanical Institute imeni V. L. Komarov, USSR Academy of Sciences, Moscow; Botanical Institute, TuSSR Academy of Sciences, Ashkhabad]

[Abstract] Heat tempering, or acquired tolerance of cells to superoptimal heating, may occur immediately after the induction heating or only after a lengthy period at normal temperature followed by a second exposure to higher temperature. To explain this observation, leaves of Tradescantia albiflora Kunth were heated in a water thermostat for 3 hrs (only half of the leaf was immersed in the water; the other served as an internal control). Viability of leaves was estimated from the negative phototaxis of the chloroplasts. Their transition was determined from the epistrophic positions, which they assumed in weak light, to paratrophic positions near the walls, which the chloroplasts assume in the normal cells upon exposure to bright light. After the tempering exposure, the test heating was carried out for 5 min at 42°C (in non-tempered leave portions this resulted in 80-90% suppression of the chloroplast phototaxis). The tempering process at 34-38°C depressed the chloroplast phototaxis somewhat, but after one day a recovery took place. With higher tempering temperatures, this recovery took longer. The absence of the tempering effect during the first days (after 40-44°C exposure) was explained by the fact that the tempering process itself so depressed the function under study that some time was required for its repair. Figure 1; references 3: 1 Russian, 2 Western.

UDC 632.35

Susceptibility of Various Rye and Other Grain Cultures to Pseudomonas Syringae Pv. Atrofaciens

18400509E Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 51 No 1Jan-Feb 89 (Manuscript received 13 Jan 88) pp 98-99

[Article by I. B. Koroleva, L. A. Pasichnik, Institute of Microbiology and Virology Ukrainian Academy of Sciences, Kiev]

[Abstract] A study is made of the sensitivity of various strains of rye to *P. Syringae pv. atrofaciens*. The susceptibility of other graincultures to the same pathogen is also studied. Studies were performed on 16 diploid and tetraploid rye varieties regionalized in the Ukraine by innoculation of vegetating plants with a bacterial suspension under fielconditions in the optimal phase for development of the bacterial infection. No strains were found to be immune to *P. Syringae pv. atrofaciens*, but significant differences were observed in the extent of damage. Most resistant was Ukrainskaya Tetra. References 5: Russian.

UDC 591.5+595.70+612.285.1

Suppression of Development of *Locusta migratoria migratoria L.* by Feeding Plants Containing Precocenes to Larvae and Prospects for Use of Such Plants in Biological Control

18400523B Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 306 No 3, May 89 (Manuscript received 9 Sep 88) pp 755-758

[Article by Ye. N. Polivanova, T. A. Triseleva, Institute of Evolutionary Morphology and Ecology of Animals imeni A. N. Severtsov, USSR Academy of Sciences, Moscow]

[Abstract] The increasing level of contamination of the biosphere with pesticides and the rising threat of Locusta migratoria migratoria L. in Africa and Southern Europe make the search for environmentally safe and effective means for controlling this insect pressing. Attempts have not yet been made at using plants themselves as a living insecticide, although this method is obviously more available, less expensive, more stable and ecologically less harmful than others. This work therefore studies the of ageratochromenes present in the tissues of living A. houstenianum on development, behavior and reproduction of the locust. The experiments indicate that a radically new prospect has now been opened for the development of biological control of locusts using a plant which can be grown near the locations where the locust breeds and across the path of possible migrations of the pest. Figure 1; References 9: 2 Russian, 7 Western.

UDC 632.913.2

Results of the Breeding of Resistant Varieties of Potatoes

18400561A Moscow ZASHCHITA RASTENIY in Russian No 3, Mar 89 p 34

[Article by A. B. Buyauskas, laboratory chief, Voke Branch, Lithuanian Scientific Research Institute of Agriculture]

[Abstract] A summary is presented of extensive breeding studies conducted in Lithuania with the object of producing nematode-resistant varieties of potatoes. The studies led to the development of varieties designated Voke, Meta, Vilnya, Nida, and Aystes. They are now under cultivation in Lithuania and are described as belonging to the species *Solanum tuberosum ssp. X europaeum Buk et Lechn.* The average harvests for these varieties range from 310 to 362 quintals/ha, have a starch content of 15.2 to 17.3%, and rate at 4.1 to 4.3 on taste scale units. In 1984 the first meristematic plants were obtained from these varieties.

UDC 632.954:633.11

Lontrel on Grain Fields

18400561B Moscow ZASHCHITA RASTENIY in Russian No 4, Apr 89 p 15

[Article by A. G. Agaronyan, senior scientific associate, Armenian Scientific Research Grain Institute]

[Abstract] Trials were conducted in 1981-1986 to assess the efficacy of the herbicide lontrel in weed control on grain fields in central Armenia. The data showed that spraying with a working solution of 400 to 800 L/ha during the first ten days of June on fields used for Bezostaya-1 winter wheat, Galgalos spring wheat, and Nutans barley resulted in a 78% reduction in total weed count. When used in combination with 2,4-D the weed killing rate was 96%.

UDC 612.1

Induction of Immune Response to B-endorphin Results in Removal of Emotional Stress in Monkeys

18400457b Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 306 No 1, May 89 (manuscript received 22 Jun 88) pp 233-236

[Article by USSR Academy of Sciences Corresponding Member A. I. Karamyan, USSR Academy of Medical Sciences Member I. P. Ashmarin, USSR Academy of Medical Sciences Member Yu. A. Pankov, A. P. Kuzmenko, T. N. Sollertinskaya, V. A. Siketin, I. L. Kofman, and Yu. P. Shorin, Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad; Moscow State University imeni M. V. Lomonosov; Institute of Experimental Endocrinology and Chemistry of Hormones, USSR Academy of Medical Sciences, Moscow; Institute of Clinical and Experimental Medicine, Siberian Division of USSR Academy of Medical Sciences, Novosibirsk]

[Abstract] Parallel physiological and immunochemical experiments were performed to determine induction and kinetics of immune response to B-endorphin in correlation with normalization of the conditioned reflex activity from objective somatic and motor indicators. Experiments were performed on 7 Java monkeys (Macaca javanensis. B-endorphin conjugate with Freund adjuvant (10% B-endophin) was administered at a dose of 250-300 μg/kg. On the seventh day after immunization, antibodies to B-endorphin were detected in the plasma. At about the 30th day, full normalization of conditioned reflex activity was observed. The data obtained supported the concept of the autoimmune mechanism underlying the physiological effects of B-endophin immunization and helped explain behavioral patterns, compartmentalization of neurotic states and increased resistance to stress stimuli. Figures 2; references 15: 8 Russian, 7 Western.

UDC 577.352.33+577.336

Use of Fluorescent Tagged Lipid Probes in Analysis of the Binding of Substance P and its Derivatives to Tachykinins Receptors in Rat Brain

18400458 Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 6 No 1, Jan 89 (manuscript received 20 Jan 88) pp 34-41

[Article by L. S. Kogtev, Yu. V. Bogdanovich, Yul. G. Molotkovskiy, Ye. M. Lazakovich. Yu. N. Utkin, V. I. Tselin, and L. D. Bergelson, Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow]

[Abstract] The binding of substance P and its analogs to rat brain membrane was investigated by a fluorescence method using two phospholipid probes [anthrylvinyl tagged analogs of phosphatidylcholine and sphingomyelin], anthrylvinyl tagged ganglioside (AG_{M3}) and a non-lipid probe diphenylhexatriene. The basis of the method is as follows: during specific binding of a ligand to a receptor, the conformation of receptor protein undergoes a change, leading to an altered molecular packing of the lipids surrounding the receptor. Such changes can be registered by determining the fluorescence anisotropy of the phospholipid probes that are part of the receptor membrane. It was concluded that these changes are due to the conformational rearrangement of the substance P receptor which influences various phospholipids in the receptor protein in different ways. Experimental data obtained by this method correlated qualitatively with data from radioactively labelled ligands. The fluorescent method described is rapid and highly sensitive, detecting 10^{-11} to 10^{-12} molar concentrations of ligands. Figures 4; references 19: 6 Russian, 13 Western.

UDC 577.[illegible]52:465

Modification of Latrotoxin Channels by Pronase and Latrotoxin Antibodies

18400534A Kiev UKRAINSKIY BIOKHIMICHESKIY ZHURNAL in Russian Vol 61 No 2, Mar-Apr 89 (Manuscript received 28 Apr 88) pp 85-89

[Article by A. N. Chanturiya, O. Ya. Shaturskiy, A. N. Nikolayenko, and V. K. Lishko, Institute of Biochemistry imeni A. V. Palladin, Ukrainian Academy of Sciences, Kiev]

[Abstract] A detailed study is presented of the transmembrane orientation of the latrotoxin channel, and the location of various fragments of the channel is studied. Studies were performed on alpha-latrotoxin obtained by fractionation. Antiserum was obtained by immunization of rabbits with the alpha-latrotoxin in Freund's adjuvant at multiple sites every two weeks for two months. Bilayer lipid membranes were formed in a 0.5 mm diameter aperture in a teflon vessel from a solution of a mixture of phosphatidyl choline with cholesterol. Latrotoxin antibodies were found to decrease channel conductivity as a function of membrane potential. Channel conformation probably varies with transmembrane potential. The selective center in the interior of the bilayer is insensitive to proteolysis of protruding segments. The potential-dependence of bonding of antibodies to the latrotoxin channel indicates that the membrane potential does change the conformation of the channel or its position in the bilayer. Figures 4; References 11: 4 Russian, 7 Western.

UDC 579.843.94.04:615.451.234

Embedding of Hydrophobicized Capsule Plague Microbe Antigen in Large Oligolamellar Liposomes

18400534B Kiev UKRAINSKIY BIOKHIMICHESKIY ZHURNAL in Russian Vol 61 No 2, Mar-Apr 89 (Manuscript received 25 May 88) pp 89-93

[Article by V. I. Zakrevskiy, N. G. Plekhanova, V. I. Smirnova, Volgograd Scientific Research Antiplague Institute]

[Abstract] Liposomes, which have adjuvant properties, increase the body's immune response to antigens introduced with them. It is difficult, however, to immobilize proteins on the outer surfaces of the vesicles to take advantage of this effect. This article studies the effectiveness of embedding an encapsulated plague antigen in liposomes prepared by detergent dialysis and phase inversion, as well as the influence of the lipid composition of the membranes on fixation of the hydrophobicized antigen. It was found that hydrophibicizing the antigen with palmitoyl chloride increased its affinity to the lipid membrane and allowed more effective embedding of the protein in the lipisomes, particularly on their outer surfaces, while retaining its serologic activity. References 10: 3 Russian, 7 Western.

UDC 577.352.3:577.344:579.841.51

Analysis of Kinetics of Change in Light Scattering in Purple Membrane Suspension

18400530b Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 6 No 2, Feb 89 (manuscript received 5 Aug 88) pp 149-152

[Article by A. D. Kaulen, L. A. Drachev, and V. V. Zorina; Interdepartmental Scientific Research Laboratory for Problems in Molecular Biology and Bioorganic Chemistry imeni A. N. Belozerskiy, Moscow State University imeni M. V. Lomonosov, Moscow]

[Abstract] Previously, when transforming intermediate M into an initial form of bacteriorhodopsin, the authors had isolated a new intermediate P. While analyzing the intermediate P, it was discovered that the optical configuration geometry of the flash photolysis apparatus can influence the form and kinetics of spectral responses. Attendant discrepancies in the form of the differential spectra of intermediate P in the shortwave region are caused by changes in light scattering during the photocycle process. In this work, three phases of the light scattering signal that are associated with individual stages of the bacteriorhodopsin photocycle were isolated. For initiating the photocycle, a neodymium laser with a modulated Q-factor and a doubled light frequency (532 nm, 15 ns, 10 mJ) was used. Changes in absorption at 400 and 335 nm and in the light scattering signal in a purple membrane suspension were determined at neutral pH, at neutral pH in the presence of a low concentration of Triton X-100, and at high pH. At neutral pH, the light scattering signal in the purple membrane suspension had a complex three-phase character. The first phase of the signal was associated with the formation of intermediate M, the second with relaxation of intermediate M, and the third with relaxation of the signal to its inital state. At neutral pH, Triton X-100 accelerated the disintegration of intermediate M and stabilized intermediate P. At high pH, the second phase was also associated with relaxation of intermediate M, but intermediate P disintegrated in the third phase. The character of light scattering signals indicated that conformational changes occurred during the formation of intermediates M and P, where intermediate P's formation was associated with protonation of retinal aldimine. Figures 1; references 18: 4 Russian, 14 Western.

Pollution From Chemicals in Latvia

18400451 Riga NAUKA I TEKHNIKA in Russian No 3, Mar 89 pp 10-14

[Article by Anatoliy Fedorovich Blyuger, Academician of the LaSSR Academy of Sciences, professor, prorector, and head of the Riga Medical Institute, and director and founder of the Latvian Hepatology Center under the "Latvia: The Health of Nature and Man" rubric: "Chemical Factors of Environmental Contamination Which are Generated by Man are the Greatest Ecological Danger to Our Republic. If the Crisis Is Not Averted, the Results Will Prove Very Serious to the Health of the Population."]

[Text] Why have ecological clouds settled on our republic, and why has the state of the environment possessed a special reverberation and even political coloring?

In the first place, the republic occupies a small territory, and the consequences of the barbaric treatment of nature, therefore, are felt especially acutely. The situation is aggravated by the fact that Latvia has many natural protected woodlands, game preserves, and also simply unique places such as, for example, a pearl of wide renown—the Riga seashore, where aggression is visible and very acutely perceived with respect to the environment and the shore.

In the second place, today we are colliding in earnest with the consequences, to say the least of unwise human activity. In recent years the chemical industry has grown rapidly in Latvia and of all the contaminants, chemical factors are the most dangerous to health.

The dictates of the central departments and the anarchy of the local councils have influenced the situation in a fateful way. The presence of Soviet power in the absence of council power undoubtedly is one of the basic social-political and economic factors which determines the lack of protection of the natural environment of any territory of our country. The departments are preoccupied with the development of their sector and economy, and look at the territory where their enterprises are located as the mother country for a colony and an environment where production activity is expanding; they are worried least of all. I stress that departmental intrusion on nature and the wealth of the people, and the absence of a careful and solicitous relationship to it, have been characteristic of the whole country—both in the Stalinist period and in the years of stagnation—and also in the initial period of perestroyka. This is a calamity of the national economy and the tragedy of Soviet economics.

The absence of real options undoubtedly has influenced the conditions of ecology locally. If a democratic order of advancement of candidates to the Councils, their accountability to the electorate, and the recall of those who have failed were put into practice, we would have deputies who are politically active and courageous and who recognize their opportunities and responsibility, and far less damage than now would be done to nature.

And just the same, this is not the most important thing. I would call the following circumstance paramount. The practice of an economy for the design and adoption of technologies providing for environmental protection have taken root in our country. Thus, in Ventspilse, where today the situation is catastrophic, there is not one enterprise which would damage the environment during normal operation. The enterprises of the city which create incredible damage in the transfer of extremely dangerous chemical products in theory are industries with a waste-free technology. However, they do not produce any products: they must obtain hermetically packed loads and hermetically transfer them further. But the notorious economy, the striving for the cheapest prices, the most rapid putting of plants into operation, and the liberal attitude toward deficiencies and defects have led to the fact that this whole integration, which in principle could have been sterile, contaminates everything around; however, they do not wish to pose the problem of improving technology—it is a matter of removing it from the city altogether. Here are the costs of an incorrect economic policy—like a Pushkin priest, they hunt for the low price, and no one is concerned about going after a safe technology, a technology which has ensured no contamination of the environment to the Japanese from analogous enterprises, for example. I do not even mention how our plants time and again "deliver" emergency situations. You worriedly expect what has happened is not remediable.

The people say that cheap is putrid. Less than 1 percent of the budget of our republic is allocated for nature conservation measures, actually for maintaining the current ecological situation. Meanwhile, any developed country spends 5 percent preserving and maintaining the ecological status and up to 8 percent of the budget funds for improving it and making it more healthful. This is greater by a factor of 5-8! One asks whether it is effective to dawdle in trivialities to correct the policy in the field of ecology and to increase the activity of deputies and so forth? Is it not more sensible first to take the bull by the horns, that is, to allocate whatever funds are finally necessary for the protection of nature? Is it not more sensible to give up the residual principle of financing, which already has nearly completely ruined public health, public education, and culture? And it is necessary to start with this! And do not waste money on the unrestrained development of new plants.

A. N. Yakovlev, a member of the CPSU Central Committee Politburo recently declared that it is necessary to introduce nature into self-financing [khozraschet] ratios; otherwise it will strongly have its revenge on us. The appeal is reasonable, although it is late—it should have been sounded a half century ago. Yes, formally the plan is to blame for all this, but in reality it is the chaotic economy. Not only the "trifles" without which the plan is aimless, but also the large-scale expenses, are not taken into consideration. Planning is done is a straight line

without reflection about the consequences, connections, and complications, and about the fact that each activity which must make a profit and have an effect necessarily requires an expenditure so that this effect is not destructive, and damage incommensurate with profit is prevented. Science has shown that with a careful relationship to ecology and the correct organization of production, any level of economic development is safe for nature and, in any case, for man, who is a component part of the ecological system.

It may be asked whether capital invested in ecology is squandered and lost as it happened in the case of appropriations for agriculture? From my point of view, the obstacle is that we lack a superstructure over, so to speak, the financial base. This is the institution which would formulate the ecological policy. Such a superstructure must be established; without it we shall find ourselves again in a land of make-believe.

Now different ministries and departments carry out ecological functions without any coordination. Some plan, others control, and still others struggle desperately. From time to time a recurrent scapegoat is indicated to an uneasy public.

We Latvians have become accustomed to blaming the medical profession for the ecological situation which has developed. This is futile. Only in the last two years have physicians halted and shut down temporarily or for a long time the work of thousands of enterprises, shops, and sites contaminating the environment, and handed over 32 cases to the public prosecutor. But it is impossible to set hopes on administrative measures; they have a temporary effect. Those who believe that physicians can cope with the situation only by resorting to Draconian punishments are in psychological captivity to the Statistical Administrative System; they naively think that by prosecuting the directors of the enterprises, we shall be able to avoid capital expenditures for improving production technology.

The founding of Goskomprirod [State Committee for Nature]—the first step toward unifying efforts in the field of environmental protection—has not come up to our expectations. We need a committee with a broader profile—for ecology, which would be concerned with the study of the interdependence of the plant and animal world and man, the effect of the contamination of nature on health, etc. The decree of the session of the LaSSR Academy of Sciences on the establishment of a Scientific Research Institute of Ecology can be considered progressive from this point of view. It is expected that it will have the means to plan policy in the field of ecology in the republic, to reserve "for itself" all institutions which participate in the development of the technology for protecting the environment and making it more healthful, and the development of standards for the status of ecology.

In this case, I think, investments will be made wisely, and we shall not suffer the fate of the agricultural industry, where funds have been invested and invested—and it is all in a quagmire. It is senseless to make allocations for protection of nature without a clear ecological policy and the maintenance of a systems approach to this area.

Ecology ideally illustrates "nature-man" systems approaches, in which absolutely everything is interrelated, and the constant maintenance of an equilibrium and balance is necessary. Instead of this, we see fluxes: they set up industrial enterprises from above with no thought of the consequences. The absence of a systems approach is one of the reasons for the crisis which has erupted. One doesn't have to be a noted scientist or great political figure in order to understand that if in a small city such as, for example, Olayne, three enterprises with improper technology eject all kinds of emissions into the atmosphere, water, and soil in front of everyone's eyes, eventually the environment will be seriously damaged. But—"after us the deluge!" Many ecologists fear this boorish and ruinous principle like the plague—we live only once and don't worry about the next generation! This approach has become entwined in the flesh and blood of many managing administrators educated in the laws of extensive economics.

Ecology today has become an exceptionally multiprofile sector of knowledge, essentially a whole set of disciplines. Perhaps, by virtue of its progression, and perhaps in the face of the true position of things, I believe that medical ecology has acquired extremely great significance for our republic.

It studies the problem of the adaptation of man to a changing environment. It determines the parameters of a clean and contaminated environment. Permissible standards of contamination are drawn up, that is, those at which there is still no loss of health. Biological testing of environmental contaminants is conducted—what levels, what substances, and what form affect the biology, physiology, and different functions of the human organism are ascertained. An enormous division of medical ecology follows from this—the hygienic standardization of the environment and hygienic regulation. In addition, on the basis of whatever these kinds of biological methods may be, a social policy should be formulated, that is, laws should be passed which are binding for all kinds of human activity.

The laws are written so that they do not violate the established standards. But how is this assured in practice? It is done by constant warning about the state of the environment—ecological monitoring. Alas, there are not enough instruments for constantly observing it and not enough apparatus which would be capable of trapping all kinds of contaminants well and rapidly.

Furthermore, the country acutely lacks the development of sanitary standards regulating how much of harmful substances can be contained in different milieus without harming human health. More than 4 million substances are now used in the world, including chemical products

(60,000 in the USSR). Hygienic standards have been developed for about 1500 substances in all.

Indicators of the people's health are the most specific feature of human ecology. People soak up fluctuations in the state of the environment like a sponge. Consequently, medical ecology is extremely urgent for us—it is connected with the life and activity of every person, inasmuch as it studies the effect of external factors on human health, lifestyle, functions, working activity, posterity, and illnesses.

How is this effect studied? The chemical contaminants of the environment in the region are investigated. How much they exceed the maximum permissible concentrations is determined. The state of the health of people in these regions is studied. Scientists look at how abiotic, biotic, and anthropogenic factors impact on it (See chart). I shall dwell on only one—the chemical anthropogenic factor, which is central for our republic.

Insert

Structure of Ecological Factors Affecting Human Health

Abiotic Factors: temperature, moisture, disturbance of the magnetic field, natural background radiation, the chemical composition of air, water, and soil.

Biotic Factors: microflora, the plant and animal world, food connections, composition of biocenoses, interspecies relationships.

Anthropogenic Factors: physical (electromagnetic fields, ionizing radiation, ultrasound, dust, noise, vibrations), chemical (emissions from industrial enterprises and transport, contact with chemical substances at an industrial plant, in agriculture, and in everyday life), biological (wastes of food and biotechnological enterprises), social-economic (demographic shifts, migration, urbanization, living conditions, nutrition, and medical measures).

Chemical agents in small doses affect the organism like biologically active substances. They interfere with the exchange of substances, with the functions of the nervous and endocrine systems, and with immunity. An effect on heredity is also shown by long-term exposure. The fetus is damaged in the pregnant organism. The number of congenital deformities increases.

Naturally, some illnesses do not manifest themselves immediately. At first the organism adapts to the action of chemical factors, and certain physiological systems are accelerated and strengthened. This is very evident in the liver. Ordinarily enzyme systems which are capable of handling the growing load on the organism begin to be activated in all chemical production workers after some period of time, as is the case in the usage of medicines or alcohol. But gradually they become depleted and break down, and the work of organs and systems is disturbed.

Chemical pathology due to the environment is very widespread. Respiratory organs are affected. The endocrine system is impaired: there is an increase in the function, or on the contrary, an insufficiency of the thyroid gland; in men, there is an increase in the frequency of adenoma of the prostate gland and sugar diabetes. Naturally the liver is impaired—its spectrum of chemical damage is enormous. Cardiovascular ailments are characteristic. Illnesses of mother and children become more frequent: there are toxicoses of pregnancy, premature births, and congenital defects of the development of the fetus. The mass of illnesses is related to chemically induced disturbances of the protective capacities of the organism: allergies, dermatitis, diseases of the bronchi and tracheae, bronchial asthma, etc.

An old hypothesis was confirmed that the higher the level of contamination of the environment, the greater the frequency of illnesses produced by them. Here it is necessary to take into consideration one "fine point": it is impossible to explain the effect of ecology on the health of a person taken individually; for this, a whole population is studied. Moreover, an ecological event rarely (only under catastrophic circumstances) produces damage in one moment; as a rule, the negative effect is the result of cumulation, and the accumulation of damage appears after the definite intervals of time lags. And, finally, a single-line analysis does not fit here; it is necessary to uncover the relationship, and this is difficult. Thus, for example, if the concentration of carbon monoxide fumes and the level of cardiovascular diseases increase somewhere, it does not follow from this at all that the increase in frequency of heart and blood vessel diseases is due to the excess carbon monoxide in the atmosphere! In order to arrive at such a conclusion it is necessary either to investigate the indicated territory twice—before the onset of the harmful factor and after the passage of some period of time (several years)—or else to compare the ecologically contaminated region with a region of the same type, but which is clean. Such research has been done repeatedly, and today it has been established that a whole group of human illnesses actually are produced by environmental contamination.

The critical ecological situation in which Latvia has found itself has aroused physicians to expand broad research. For three years (1988-1990) they will be carrying out the program of the USSR State Committee for Science and Engineering, "Study of the Effect of Chemical Factors of the Environment on the Health of the Population of the Cities of Ventspilse, Olayne, and Jurmala, and the Development of Measures for Reinforcing This Study." We see that the "illness centers" of the republic have been covered. But Riga should also be studied.

The research is being conducted in three divisions.

The first is the study of the sanitary-hygienic state of chemical contamination of the atmosphere, that is, air of the workplace or of the protected zone of one or another enterprise, and measurements of water, soil, and food products.

The second is the study of the state of the health of the population. The mortality and morbidity rates, invalidism,

and the amount of time lost from work are revealed by statistical methods. Clinical biochemical, immunological, genetic, epidemiological, and physiological function methods are also used. The objective is to find an integrative indicator of the population which correlates the interrelationships of man with the environment. If the indicator is good, it means the environment is "favorable," and if it is worse than the standard, it is a signal of ecological pollution.

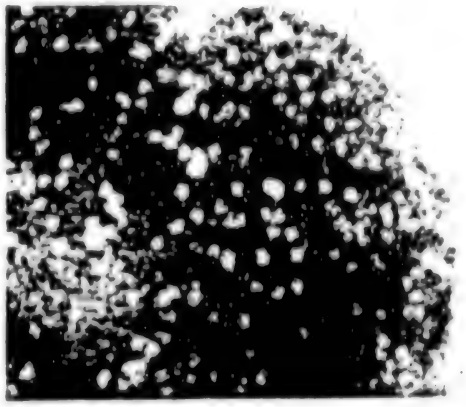
The third division is the development of recommendations for improving health and bringing the environment up to standards. They are addressed by the people themselves, the enterprises and institutions, the local councils, public health agencies, and administrative agencies, which must take the corresponding measures. This is the basic role of physicians in the organization setting standards.

Many departments and subdivisons of the Riga Medical Institute and all scientific research institutes of the LaSSR Ministry of Health are participating in this research.

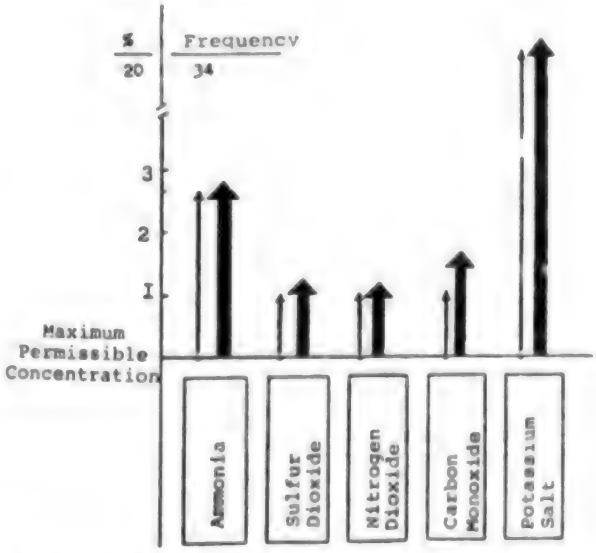
The impact of these forces is large, inasmuch as there are four large chemically dangerous regions in the small area of the republic (we shall not mention areas which are dangerous from other factors). Regions are divided into four categories according to degree of the toxicity of the substances which are circulating in the environment. The city of Ventspilse belongs to the first, the highest category of danger to us, where chemical poisons such as liquid ammonia, acrylonitrile, methanol, isobutanol, and also petroleum products circulate (sometimes in thousands of metric tons). Riga belongs to the second category—tens of metric tons of liquid chlorine, hundreds of tons of acids and alkalies, and also transport of ammonia, acrylonitrile, methanol, petroleum products, etc., through the city. The city of Olayne belongs to the third category: acids are the chief contaminant. The health resort (!) Jurmala, where the salutary factors are "enriched" with sulfoxide, nitrogen oxides, carbon monoxide fumes, and ammonia, stands at the same level with it.

The results of research on air, water, and soil in these cities and vicinities, and also measurements of chemical substances in production workplaces revealed violations of dangerous concentrations of chemical agents (See illustrations). Thus, concentrations of hydrochloric and sulfuric acids, isopropanol, formaldehyde, phenol, acetone, methanol, ammonia, and other harmful substances are frequently higher (by a factor of 2.5 and more) in air samples taken in the Olayne region. Atmospheric air is constantly contaminated.

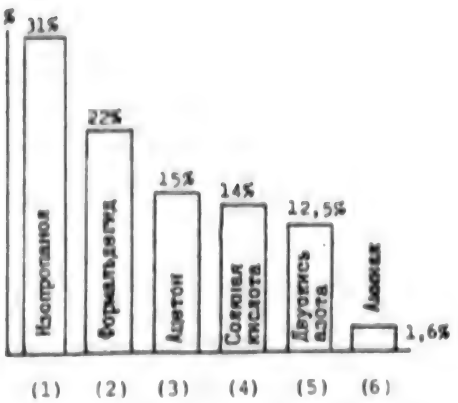
A priori it is clear that there is no place for the pulp and paper plant in Jurmala. If this plant were located in the Karakumy desert, then according to all the rules it should have a sanitary-protective zone of 100 meters. And such a zone is not only absent on the Riga beach, but there is tolerance of the fact that 700 people live near the plant and are subjected to the action of chemical substances.



In addition to anthropogenic chemical pollutants, biological damage to the environment negatively affects human health. An example is the spring and autumn outbreaks of hepatitis A in Riga in 1988. They were caused by contamination of the Daugava River by sewage as the result of the poor operation of sewage disposal plants. About 1000 people became ill in Riga. The cost of curing them was approximately 1 million rubles. The photograph is of hepatitis A isolated directly from water by V. Saulite and V. Ose, staff members of the Institute of Microbiology of the LaSSR Academy of Sciences. The microphotograph is from the archive of the institute.

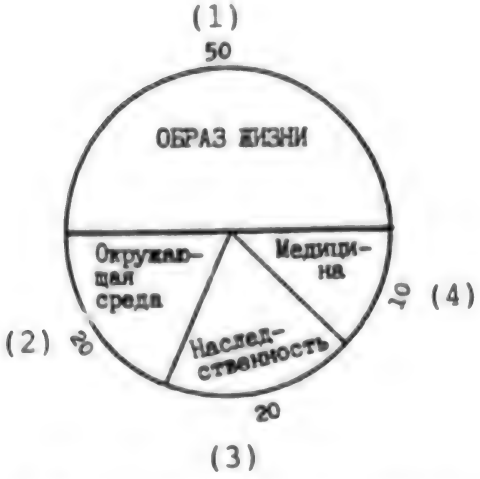


Number of cases (in percent) and degree (frequency) exceeding the maximum permissible concentrations of chemical compounds in the protected zone of the Ventspilse Port Plant in 1988.



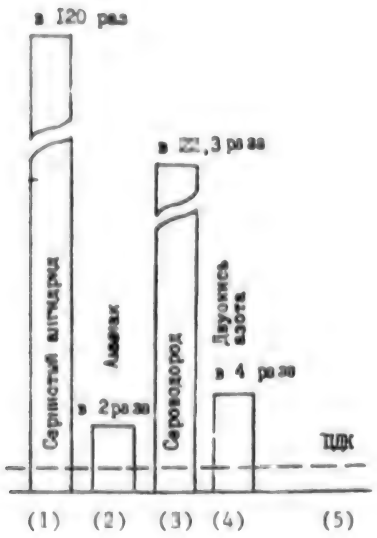
Frequency of the appearance of contamination of atmospheric air in Olayne, the city of chemists—cases of exceeding the maximum permissible concentrations (in percentage of the total number of studies).

Key: —1. Isopropanol; —2. Formaldehyde;—3. Acetone; 4. Hydrochloric Acid; —5. Nitrogen Dioxide; —6. Ammonia



Factors affecting human health. Although the environment in the figure is assigned a 20 percent effect, in reality, however, it is an effect many-fold greater: through food, which is a component of the lifestyle (contamination of products with pesticides, nitrates, antibiotics, hormones, and other substances) and through the effect on heredity. On the contrary, the role of medicine in our time has been reduced, and the Western press frequently calls the Ministry of Health "Mister Ten Percent."

Key:—1. Lifestyle;—2. Environment;—3. Heredity;—4. Medicine



Maximum single increase in the maximum permissible concentrations of toxic substances in the air of the city-shore of Jurmala in 1987. Pamphlets, booklets, and newspapers as before advertise the salutary air at the shore of the Yantarnyy Sea [which includes] ozone and bactericide-fungicide-protozoacides. Meanwhile, the unique strip between the Gulf of Riga and the Lielupe River is ruined and is converted into industrial residues.

Key:—1. Sulfuric Anhydride (by a factor of 120);—2. Ammonia (by a factor of 2);—3. Hydrogen Sulfide (by a factor of 22.3);—4. Nitrogen Dioxide (by a factor of 4);—5. Maximum Permissible Concentration

Research conducted by the staffs of the republic's sanitary station, the Institute of Organic Synthesis of the LaSSR Academy of Sciences, and the Riga Medical Institute uncovered the acute negative strain on the ecological situation from Ventspilse enterprises, especially the Ventspilse plant near the port. In a number of samples of atmospheric air, elevated concentrations of ammonia, dust, nitrogen, and sulfur dioxide, and carbon monoxide were found. A dangerous content of potassium salt in the air within a radius of 1000 meters was recorded in 20 percent of the samples, and in some cases it was a factor of 34 above the standard. The situation was still worse in the workplaces, where such chemical products as ammonia, methanol, isobutanol, acrylonitrile, etc., were observed. A number of emergencies were recorded in a comparatively short period of time. A marked contamination by potassium salt and vaporized hydrocarbons (petroleum storage base) was found.

The results of research have already revealed negative shifts in the health of the population. For example, the staff of the health department found that children in Olayne were somewhat retarded in physical development (in comparison with those of the same age in Sigulda). The children here more frequently suffer from

acute respiratory illnesses, allergies, and diseases of the central nervous system. The lowering of immunity was found to be the primary explanations for the large number of cases of colds in children. Women in Olayne more frequently had gynecological ailments and premature births; their pregnancy went worse, and a larger number of premature babies were born. Special immunological research revealed a weakening of the resistance of the organism in people working at chemical enterprises in Olayne. Statistical data on Jurmala recorded an increase in the number of children suffering from bronchial asthma and chronic lesions of the lungs, and also an increase in the frequency of contact dermatitis and a certain rise in diseases of digestive organs of adults.

A comparison of health indicators done at Ventspilse 10 years apart (1977, that is, before the start-up of the chemical enterprise, and 1988), and also with analogous indicators in some other cities of the republic governance showed that the frequency of bronchial asthma in adults and children and the relative rate of allergic dermatoses increased here; a trend was noted toward a rise in endocrine pathology (disease of the thyroid gland); anemia in pregnant women, late toxicoses of pregnancy, premature births, and congenital birth defects were more frequent, and the frequency of Down syndrome (one of its symptoms is retardation) exceeded the average European indicators by a factor of 1.5.

In spite of the fact that this is all preliminary data, two principal conclusions can be drawn:

ochemical enterprises of the republic with regard to imperfection of technology and disgraceful organization of work grossly damage the ecological state of the environment;

othe chemical contaminants studied negatively affect the health of the people.

And, indeed, we have described authorized and standard situations. Dismay seizes you when you depict what can happen in nonauthorized, accident situations in these chemical dangerous regions of Latvia and the menace here is no laughing matter. In the last several months there have been five (!) accidents at the Ventspilse port plant, with enormous emissions of poisonous substances. This is a "warning bell." Furthermore, annual stockpiles of strongly acting poisonous substances are sometimes stored in warehouses. In addition, we shall mention the chemical trains with tanks of these substances going through Riga. How long [is this to continue]?! I do not want to appear in the role of the prophetess Cassandra, but if only one such train should happen to have an accident (and we know the state of the railroad tracks in certain sections of the railroad), this will be a classical chemical Chernobyl without the slightest exaggeration. Finally, the storage of many metric tons of chlorine at certain establishments produces concern. The situation, therefore, is extreme.

What is to be done?

In general, the answer is clear—to develop finally a judicious ecological policy, to make the necessary appropriations, to modernize the social-political conditions, and to make the economy more healthful. Just the same, a minimum of immediate and urgent measures are needed nevertheless.

The physicians propose: 1) to close the Slok pulp and paper plant; to change the profile of the Ventaspilse port plant to less toxic chemical substances (for example, fertilizers); 2) to equip pollution-control equipment in Riga not with antediluvian (chlorination and coagulation of water), but with modern (ozonization or treatment with radioisotopes) technologies; this averts a multitude of illnesses, primary from viruses; 3) to prohibit trains from going through Riga and other large cities with strong-acting poisons; 4) to solve the problem of burial sites for disposal of industrial toxic wastes which now are dumped anywhere; 5) to convert to safer methods for applying pesticides (in mixtures with phospholipids) which are to be used in smaller doses and which are less toxic to the environment while maintaining the level of yield already achieved; to accelerate work on the replacement of pesticides with biological methods of plant protection; 6) to intensify the top-level work of the occupational hygiene and occupational disease section of the Riga Medical Institute on determining the maximum permissible concentrations and the reference points for danger levels of the action of chemical and biological substances produced by industry in the republic (standards have already been established for 50 such substances), for the purpose of making it incumbent upon production enterprises to finance the indicated work; 7) to organize according to the example of a great number of countries clean ("chemical-free") zones for the production of agricultural products (primarily milk and meat) for children.

This is the very minimum which can reduce ecological pressure on the health of the Latvian population.

UDC 579.842.11:579.255].08

Intra- and Intermolecular Recombination of Test Plasmids in *Escherichia coli* K12 Cells Carrying the RTF-Derivative of R1drd-19 Plasmid

18400547a Moscow MOLEKULYARNAYA GENETIKA, MIKROBIOLOGIYA I VIRUSOLOGIYA in Russian No 3, Mar 89 (manuscript received 4 Apr 88) pp 10-15

[Article by M. A. Terentyev and L. S. Chernin, Institute of Chemical Physics, USSR Academy of Sciences, Moscow]

[Abstract] On the basis of vector plasmids, special structures have been developed which allow the substrate specificity of recombination enzymes to be evaluated and the nucleotide sequence and topology of recombination products to be studied. An important advantage of such systems is the feasibility of quantitatively evaluating intra- and intermolecular interactions of model DNA structures in cells of bacterial strains which are differentiated by genotype. The R1drd-19 plasmid increases the level of post-conjugational recombination and resistance to UV-light of *E. coli* cells which have a defective V(RecBCD) exonuclease, and the plasmid determines the production of ATP-dependent exonuclease in cells from such strains, which compensates for the defectiveness of the host enzyme. In this work, quantitative analysis of the influence of R1drd-19 plasmid on the recombination process in recB cells was conducted, using a system of model plasmid substrates. The parameters of plasmid recombination and the composition and ratio of products of model substrate recombination in a strain of this genotype were significantly superior to the corresponding properties of a plasmid-free strain with a defect in the RecBCD nuclease and an Rec$^+$ strain. It was noted that the presence of R1drd-19 guaranteed compensation for the defect in the recB gene and activity in the host-cell which was unusual for the character and effectivness of the product determined by the plasmid. Apparently, this product prompted the reaction of homologous sequences in inter- and intramolecular occurrences. It was concluded that the R1drd-19 plasmid determined a new recombination pathway in *E. coli* cells which has been designated RecP. The plasmid recombination process along this minor path was more effective than along the main RecBCD pathway coded by a system of host genes. Figures 1; references 15: 5 Russian, 10 Western.

UDC 579.842.11:579.253]:579.222.08

Localization of SsoII Restrictase and Methylase Genes on Map of P4 Plasmid

18400547b Moscow MOLEKULYARNAYA GENETIKA, MIKROBIOLOGIYA I VIRUSOLOGIYA in Russian No 3, Mar 89 (manuscript received 26 Apr 88) pp 16-20

[Article by A. S. Karyagina, V. G. Lunin, I. I. Nikolskaya, and S. S. Debov, Scientific Research Institute of Medical Enzymology, USSR Academy of Medical Sciences, Moscow]

[Abstract] A great deal of work is being conducted on studying the molecular-genetic basis of the host-specific system (HSS) of DNA to bacteria. Problems are being solved in practical applications—obtaining more effective restrictase (R) and methylase (M) producers based on cloning R and M genes into an expression vector—and in the interests of science—coding the primary structure and functional character of R and M genes. In this work, data were obtained on the localization of SsoII R and M genes on the physical map of the natural P4 plasmid from the *Shigella sonnei* 47 strain. It had been determined in previous experiments that the DNA sequence for coding SsoII R and M enzymes contains approximately 1000 positions, based on the 40 kD molecular weight of these enzymes. It was also determined from the literature that the R and M genes in plasmids are arranged in direct proximity to each other or even partially overlap. When this information was combined with data obtained in the current work, the authors concluded that the MSsoII gene occupies positions 550-600 to 1550-1600 and the RSsoII gene occupies positions 1550-1600 to 2550-2600. Localization of these genes makes directed cloning of minimal fragments, carrying genes of interest, into the expression vector, with the aim of developing SsoII HSS enzyme super-producers. Figures 2; references 15: 3 Russian, 12 Western.

UDC 579.7.852.11:579.252.5:577.21

Intraspecies Plasmid Transformation of *Bacillus thuringiensis*

18400547c Moscow MOLEKULYARNAYA GENETIKA, MIKROBIOLOGIYA I VIRUSOLOGIYA in Russian No 3, Mar 89 (manuscript received 5 Apr 88) pp 25-28

[Article by V. V. Bessoltsev and L. I. Zhuchi'in, Irkutsk University]

[Abstract] It is difficult to study the molecular genetics of *Bacillus thuringiensis*, an entomopathogenic bacterium which is widely used as a means of biological insect control. Investigations are complicated by the absence of reliable gene transfer systems and molecular cloning methods. Recent attempts have been made to find corresponding vectors. Because *B. thuringiensis* plasmids remain cryptic and do not have reliable markers, researchers have conducted the transformation with *Staphylococcus aureus* or *Bacillus cereus*, which are capable of replication and expression in *B. thuringiensis* cells. In this work, intraspecies transformation was conducted with small plasmids from natural isolates of *B. thuringiensis*. All strains used in the work were provided by V. S. Kulagin, director of the scientific staff of the Scientific Research Institute of Biology at Irkutsk University. Tetracycline-resistant clones were obtained in the experiments. A significant portion of the transformants exhibited resistance to lysozyme. Results of the transformation depended on the donor-recipient pairs and on unexplained variations in experimental conditions, possibly from variations in the degree of protoplast formation. On the whole, the transformation of *B. thuringiensis* strains with plasmids from donor strains of the same species

led to results similar to those obtained by other authors when using foreign plasmid DNA. Inconsistent results could not be explained by the genesis of plasmids from bacteria of other species. Additionally, intraspecies and intravariant transformations led to more significant restructuring of the bacterium's genome. Reasons for this were probably the greater generality of the integration mechanism, similarity of the integration sites, and the high abundance of elements in *B. thuringiensis* which can be similarly transposed. References 12: 3 Russian, 9 Western.

UDC 615.339:578.245].015.46.07

Immunomodulating Properties of Interferon Inductors

18400594B Moscow ANTIBIOTIKI I KHIMIOTERAPIYA in Russian Vol 34 No 4, Apr 89 (manuscript received 8 Jan 88) pp 270-276

[Article by F. I. Ershov, E. B. Tazulakhova, Scientific Research Design and Production Institute of Biologically Active Substances, USSR Ministry of Medical and Microbiological Industry, Berdsk]

[Abstract] Data obtained in recent years on the direct and reversible links between the immune system and interferon are summarized. Interferon inductors may be used as an antiviral remedy as well as for regulating immunity. Viruses used included influenza A/Pr 8/34 (HONI), common herpes (strain L2 type I), rabies (strain Yak), acute human encephalomyelitis (Reznik strain), and mouse encephalomyocarditis (Columbia strain). Vaccines were prepared, and inbred mice were used for studying humoral response. CBA mice were used for inducing interferon and isolating cells of the immune system. Polyguacil, lafarin, poly(I)poly(Ts), inosiplex, and dextran sulfate were used as interferon inductors and immunomodulators. The researchers found that the combined use of immunomodulators and ds-RNA leads to stimulation of the interferon and immune systems—i.e., to an increase in interferon titers (when dextran sulfate is used) or to prolongation of interferon synthesis (when inosiplex is used). With inosiplex, the effect is a function of the dose of the inductor and the time of introduction relative to the immunomodulator. Inductors have many immunomodulating properties and act on cellular immunity, inhibiting delayed hypersensitivity, the rejection response of a transplantate, and mitogen-dependent blast transformation. Using interferon inductors and immunomodulators together is felt to hold promise for the possibility of controlling the interferon system as well as for immune correction. Figures 6, references 29: 9 Russian, 20 Western.

UDC 577.391.621.384.3

Standardizing Far Infra-red Range Laser Radiation

18400404 Moscow RADIOBIOLOGIYA in Russian
Vol 28 No 6, Nov-Dec 88 pp 841-843

[Article by I. N. Ushkova, V. B. Dulskiy, N. Yu. Malkova and E. I. Marfenko]

[Text] The state of the cornea under the effect of diffused radiation with a 10.6 micrometers wave-length and different periods of power exposure was studied in male rabbits by biomicroscopy with intravital stain. The maximum permissible level [MPL] of radiation was determined.

High power lasers are presently being used more and more frequently in industry and medicine. Lasers with a power of hundreds of watts, operating on a 10.6 micrometers wave-length are used in metal cutting and welding and in medicine. In view of this, labor hygienists must establish safe levels of laser radiation and develop means of protection.

In order to determine safe levels of 10.6 micrometers wave-length radiation, studies were carried out in industry in order to assess objectively experimental works based on the study of the conditions and nature of the work of quantum generator assemblers which involves assembly of gas lasers and with the preparation, on the basis of these, of different types of laser technological and medical devices. During assembly, which includes approbation of the device for producing radiation, bringing the device up to maximum power, achieving the required physical characteristics of the device, measuring the laser radiation power, adjustment and technological travelling allowance of the device, performance of control measurements of the power characteristics of radiation, the quantum generator assembler is exposed to diffusely reflected laser radiation. An ILD-2 device was used to take readings of surfaces in different points of the working zone. Distances between the object of reflection and the worker's eye ranged from 30-100 cm, during which time the power intensity of the diffusely reflected laser radiation changed within limits of 5X10up to $2X10^{-1}$ w/cm^2. Such a wide range of power intensity can be explained by the fact that the optical scheme of some devices such as "Romashki-1", for example, includes four independent laser radiators of the LGN-701 or LGN-703 type. The power intensity changes as a function of the number of radiators switched on.

Energy exposure from a single radiation burst at the work place of quantum generator assemblers is 0.15-9.4 J/cm^2. Results of ophthalmological study of 63 workers in comparison with 44 members of a control group showed changes of lability of the optic analyzer and thresholds of light vision.

We performed experiments in order to define the amount of the maximum permissible level of radiation more precisely. Studies were performed on 48 eyes of male chinchilla rabbits. In order to obtain animals with healthy eyes, an ophthalmologist examined each rabbit at the start of the experiment; biomicroscopic study was performed with the use of intravital staining of the retina epithelium with a 1 percent solution of sodium fluorescein. The animals were placed on a stand in a physiological position at the moment of exposure to the laser radiation, with some limitations on their movement. We assessed the clinical picture immediately after the effect of laser radiation and after 1 and 5 days by method [1]. The radiation source was an LGN-703 type series CO_2-laser with 30 watts output power. Laser emission was reduced and scattered by use of a brass plate and also by a plane parallel quartz plate or a brass close-mesh netting. Power intensity varied within limits from 0.11-0.44 W/cm^2. Measurements of energy characteristics of the radiation were performed by using an ILP-2 device (error of measurements + or -30 percent). We changed duration of effect of radiation from 30 seconds up to 4 minutes. Diameter of the radiation spot on the rabbit cornea was 0.8 cm. Studies were performed in two stages: at the first stage, we varied the power intensity which produced the effect observed at a fixed time of irradiation; at the second stage, on the contrary, we changed the duration of irradiation with a fixed power intensity. We took the miniumun amount of power intensity which causes irreversible changes in the cornea for the threshold of effect. The criterion of effect was the burn (opacification) of the cornea without consideration of its degree.

Corneal injuries were not observed at a power intensity of 0.11 W/cm^2 and duration of effect of 240 s. Power intensity equal to 0.22 W/cm^2 caused corneal opacification in 17 percent of the cases and, at this same time, power intensity of 0.33 W/cm^2 caused opacification in 66 percent of the cases and power intensity of 0.44 W/cm^2 caused opacification in 100 percent of the cases. We processed the experimental data by the method of probit-analysis [2]. We determined the value of power of effect ED_{50} [3], equalling 0.29 (0.26-0.33) W/cm^2. At the second stage, with fixed power intensity of 0.29 W/cm^2, we varied the duration of irradiation from 30 s up to 4 minutes. At a duration of irradiation of 30 s, spot, superficial corneal erosions occurred in 100 percent of the cases, with complete restoration of them by the 5th day. With duration of irradiation of 1 minute, persistent opacification with superficial corneal erosions occurred in 33 percent of the cases. With an increase of the duration of effect up to 2 minutes, the frequency of rise of persistent opacifications increased up to 66.6 percent. Power intensity of 0.29 W/cm^2 with 4 minute duration of irradiation caused persistent irreversible corneal opacifications in 100 percent of the cases. On the basis of experimental data of the 2d stage, we determined the time of effect ET_{50}, equalling 102 (62.4-169.2) s. Determination of ED_{50} and ET_{50} made it possible to determine the maximum possible intensity of radiation [4]: .cj MPL=$ED_{50_{50}}$/ K_3=0.29X102/10=2.96 J/cm^2 .lj where K_3 is the supply factor, equal to 10.

Consequently, the value of the maximum permissible laser radiation level with a wave-length of 10.6 micrometers

equals 2.96 J/cm^2. The value of the maximum permissible laser radiation level, presented in "Sanitation Standards and Rules of Construction and Use of Lasers" [5] is 4.03 J/cm^2 and, according to data of the international standard of the World Health Organization "Optical Radiation Caused by Lasers" [6], it is 10.2 J/cm^2. Later, the value of the maximum permissible level of radiation, obtained in an acute experiment, will be obtained by us by results obtained in a chronic experiment.

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UDC 615.384:547.221].03:616.36-005.4-084

Antiischemic Liver Protection with Perfluorocarbon Emulsion

18400515A Moscow GEMATOLOGIYA I TRANSFUZIOLOGIYA in Russian Vol 34 No 1, Jan 89 (Manuscript received 14 Jul 87) pp 38-41

[Article by N. I. Afonin, Doctor of Medical Sciences, U. U. Akhsyanov, D. P. Sidlyarov, S. A. Kozlov, Ye. N. Kiselev, Yu. V. Zinovyev, All-Union Hematologic Science Center, USSR Ministry of Health, Moscow; Scientific Research Institute of Hematology and Blood Transfusion, Kirov]

[Abstract] A study is made of the antiischemic effectiveness of Soviet perfluorocarbon emulsion with respect to the liver when it is not connected to the general circulation. Forty-three experiments were performed on chinchilla rabbits, with a 90-minute constriction of the hepatoduodenal ligament, with hypothermic open-loop profusion of the liver. Profusion of the liver with perfluorocarbon emulsion had a statistically significant positive influence on survival of the rabbits. The substance improved liver function, decreased portal pressure, increased portal blood flow and decreased vascular resistance in the portal vein system. Figures 2.

UDC 615.384.03.07

Physiological Principles of Clinical Use of Oxygen-Carrying Blood Substitutes

18400515B Moscow GEMATOLOGIYA I TRANSFUZIOLOGIYA in Russian Vol 34 No 1, Jan 89 (Manuscript received 5 Feb 88) pp 42-47

[Article by K. P. Ivanov, Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences, Leningrad]

[Abstract] This review discusses the problem of developing oxygen-carrying blood substitutes for clinical work. The primary problem is that natural blood carries oxygen in the erythrocytes, the membranes of which "separate" their interior from the blood, allowing a relatively large quantity of oxygen to be transported without increasing the overall oxygen tension in the blood. Attempts to develop blood substitutes with hemoglobin in solution rather than contained in erythrocytes have not yielded substitutes which can carry sufficient quantities of oxygen while maintaining the proper viscosity to allow blood flow through tiny capillaries. Attempts to make artificial erythrocytes are not promising and excessive use of blood substitutes disrupts the normal coagulation of the blood. Future predictions must therefore be quite cautious. New ideas, plans and methods are needed if this problem is to be solved. References 22: 15 Russian, 7 Western.

BION Stimulatory Apparatus Used at Ufa Burn Center

18400581 Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 1 Jul 89 p 4

[Article by F. Zinko, Odessa, under the rubric "Proposed for Introduction": "'Bions' Against Burns"]

[Abstract] The BION apparatus, which was created by the Odessa full-cost-accounting association FIZLI and for which foreign orders have been received, can remove patients from shock. It is now in use at the Ufa Burn Center. The device is a portable unit that uses the ability of man and animals to generate electric current. No external power supply is used. It can be used for electric acupuncture, transmitting pulses from one point on a patient to another, stimulating biochemical processes in the cells. The device is very useful in fatigue, hypertension, migraine, vasomotor-allergic states, rheumatism, radiculitis, and pain syndrome. In the resuscitation unit of the Ufa Burn Center, the unit has demonstrated its ability to treat shock in burn patients. More than 100 patients have been helped by the more than 50 units delivered to the burn center.

UDC 579.842.23.22

Assimilation of Iron by Plague Microbe in Iron-Deficient Media

18400509A Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 51 No 1 Jan-Feb 89 (Manuscript received 24 Feb 87) pp 13-18

[Article by B. D. Rublev, V. S. Kagramanov, O. S. Bursha, V. Yu. Ryzhkov, Rostov-na-Donu Scientific Research Antiplague Institute]

[Abstract] Iron metabolism is intimately involved in the virulence of the plague microbe. Avirulent microbes become virulent when iron ions are present, ions of other metals not having the same effect. This article presents a comparative study of the ability of virulent and vaccine cells of the plague microbe to assimilate iron when cultivated in iron-deficient media. Accumulation of low-molecular-mass siderophors was not observed in these media. However, the plague pathogen cells could assimilate iron when iron-containing proteins were in direct contact with the cell surface. These assimilation mechanisms were more clearly seen in the virulent strains. Figures 2; references 14 (Western).

UDC 632.937

Effect of Toxic Metabolites of Entomophilic Fungus Aschersonia Aleyrodis Webber on Greenhouse Whitefly

18400509B Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 51 No 1, Jan-Feb 89 (Manuscript received 13 Jul 87) pp 56-58

[Article by Z. A. Kurbatskaya and A. G. Subbota, Institute of Microbiology and Virology, Ukrainian Academy of Sciences, Kiev]

[Abstract] Entomopathogenic fungus cultures have the capability to form toxins, and their toxic metabolites have a fatal effect on insects. The toxin-forming fungus *Aschersonia aleyrodis* Webber produces substances which have antibiotic activity, protozoan and dermonecrotic effects. This article studies the effect of the toxic metabolites on the greenhouse whitefly *Trialeurodes vaporariorum* Westw. It is found to induce a 100% death rate at the nymph stage in vitro. In the egg stage an inhibiting effect is observed. Figure 1; References 17: 16 Russian, 1 Western.

UDC 615.31:661.185].012.6

Targeted Screening of Bacteria That Destroy Surfactants

18400528 Moscow ANTIBIOTIKI I KHIMIOTERAPIYA in Russian Vol 34 No 3, Mar 89 (Manuscript received 23 Dec 87) pp 192-194

[Article by M. K. Shcheglova, T. N. Moiseyeva, V. K. Kamyshenkova, Saratov University imeni N. G. Chernyshevskiy]

[Abstract] The purpose of this study was to develop a method for screening microbes that break down cationic surfactants, the basis for the screening being the ability of certain chemical reagents to form stained complexes with cationic surfactants. The source of the microbes in the study were water samples taken from Saratov's Zaletayev Purification Units. The surfactants used were undecylpyridium bromide, cetylpyridium bromide, α-methylcetylpyridium bromide, β-methylcetylpyridium bromide, tridecylpyridium bromide, nonylpyridium iodide, benzyltriethylammonium chloride, benzyltriphenylphosphonium chloride, and dodecylaminoacetate. The studies show that the method, based on the interaction of cationic surfactants and organic dyes, can be used to find microbes which break down a broad range of such surfactants. The method is simple and fast, suitable for rapid determination of biodegradability of cationic surfactants of varying chemical structure. References 4: Russian.

UDC 579.835.11.04:582.542.1]:579.25

Role of Chemotaxis Genes in Associative Interactions Between Azospirillum Brasilense and Wheat

18400593B Moscow MOLEKULYARNAYA GENETIKA, MIKROBIOLOGIYA I VIRUSOLOGII in Russian No 4, Apr 89 (manuscript received 14 May 88) pp 24-32

[Article by T. I. Bakanchikova, A. G. Myakinkov, L. K. Pavlova-Ivanova and A. N. Maysuryan, All-Union Scientific Research Institute of Agricultural Biotechnology, All-Union Academy of Agricultural Sciences imeni Lenin, Moscow]

[Abstract] An analysis was conducted on the significance of chemotaxis genes in the associative interactions between A. brasilense and wheat plants, employing Tn5 Che^- insertion mutants. The ability of the A. brasilense Che^- strains was tested for their ability to adhere to wheat plant roots. The results demonstrated that in at least two Che^- mutants the ability to adsorb and adhere to 3-day-old shoots was reduced by 2- to 3-fold in comparison with the wild strain. The reversion mutants of these strains (Che^+) not only demonstrated recovery of adhesion, but also exceeded the baseline adhesion by 3.5-fold. These observations point to the importance of chemotactic properties of azospirilla in the formation of associative interrelationships with grain plants. Figures 1; references 29: 3 Russian, 26 Western.

UDC 615.33.912.6

Directed Screening of Bacterial Siderophore Antibiotics

18400594a Moscow ANTIBIOTIKI I KHIMIOTERAPIYA in Russian Vol 34 No 4, Apr 89 (manuscript 23 Dec 87) pp 251-254

[Article by V. V. Smirnov, Ye. A. Kiprianova, O. I. Boiko, E. A. Kolesova, Institute of Microbiology and Virology, UkSSR Academy of Sciences, Kiev]

[Abstract] Siderophores (siderochromes) are biologically active compounds that transport iron and are widely found among aerobic microorganisms. Many are antibiotics. In recent years, researchers began to study such compounds when they discovered the antifungal activity of pseudobactins, the fluorescing pigments of Pseudomonas bacteria that have a high affinity to iron and that form stable complexes with it. Competing with fungal siderochromes for iron, the pseudobactins have a fungistatic effect. Since there is little information about other siderochromes formed by Pseudomonas bacteria, the researchers studied the ability of 275 strains of 15 species of Pseudomonas bacteria to synthesize siderophore antibiotics that are antifungal. Strains of several species of Pseudomonas were studied on King agar cultures without iron and with $FeCl_3$. Various fungal strains that cause diseases in agricultural plants were used as test cultures. Most strains retained their antifungal activity in the presence of iron. The effect of iron on the antibiotic activity of raw antibiotic products and individual antibiotic substances was studied. Phenazines and aromatic compounds have less affinity for iron than siderophores of phytopathogenic fungi. Biosynthesis of these antibiotics is increased in the absence of iron. The five most antagonistic strains were various biotypes of P. fluorescens. Figures 1, references 12: 3 Russian, 9 Western.

UDC 615.31:547.466.3].015.4:616.831.71-008.922.1].07

Effects of Certain Pharmacological Preparations on Electrical Activity of Cerebellar Slices in Hypoxia

18400483A Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 52 No 1, Jan 89 (manuscript received 7 May 88) pp 12-16

[Article by I. G. Vlasova, N. A. Agadzhanyan, and L. D. Lukyanova, Chair of Normal Physiology, Peoples' Friendship University imeni P. Lumumba, Moscow; Laboratory of Bioenergetics, Scientific Research Institute of Pharmacology, USSR Academy of Medical Sciences, Moscow]

[Text]An analysis was conducted on the effects of several antihypoxic agents on the electrical activity of cerebellar slices under conditions ranging from normal to zero oxygen tension. The slices, 300-500 μ thick, were derived from 2- to 3-week-old rats. The agents (GABA, piracetam, gutimine, sodium hydroxybutyrate) were introduced 10-15 min prior to the hypoxic stage. Analysis of the spontaneous electrical activity of the Purkinje cells showed variable phasic changes, generally consisting of initial activation of the discharge rate to be followed by inhibition. In the case of GABA, a clearly defined dose-effect relationship was discerned. Low concentrations of GABA on the order of 10^{-7} to 10^{-5} M induced a 40% increase in activity, to be eventually replaced by about a 30% reduction in activity. High levels of GABA (10^{-4} to 10^{-3} M) led to marked inhibition (about 80%). Gutimine, however, in concentrations of 10^{-6} to 10^{-5} M enhanced spontaneous activity by 60% and activated previously silent neurons. GABA, piracetam, and sodium hydroxybutyrate increased the tolerance of the cerebellar neurons to low oxygen tensions. Onset of electrical depression was delayed and complete cessation of activity did not take place, as it did with control preparations. In addition, these agents facilitated faster recovery of spontaneous activity on return to normotensive oxygen states. Gutimine, however, in concentrations of 10^{-6} to 2 x 10^{-5} M inhibited neuronal activity even in 70% O_2. These observations demonstrated that cerebellar slices represent a convenient model for identifying antihypoxic agents with a direct mechanism of action, such as GABA, piracetam, and sodium hydroxybutyrate. The antihypoxic properties of gutimine seen under in vivo conditions apparently involve extracellular mechanisms, since in the in vitro studies gutimine potentiated the effects of hypoxia. Figures 3; references 17: 15 Russian, 2 Western.

UDC 615.216.5:[615.451.234:547.953].015.4:612.822.3

Effects of Liposomal Tubocurarine on EEG in Experimental Animals

18400483B Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 52 No 1, Jan 89 (manuscript received 26 May 88) pp 20-23

[Article by R. N. Alyautdin and V. I. Filippov, Chair of Pharmacology, Therapeutic and Sanitary-Hygiene Faculties, 1st Moscow Medical Institute imeni I. M. Sechenov]

[Abstract] Trials were conducted to determine the possibility the delivery of liposomally enclosed tubocurarine across the blood-brain barrier. The liposomes were prepared from phosphatidylcholine and cholesterol (5:2 and 7:2 combinations), with some liposomes supplemented with a ferromagnetic. The tubocurarine-bearing liposomes were delivered to cats and outbred male rats via intravenous injection, with EEG monitoring performed by means of epidural electrodes. Within 5-15 min of administration of the tubocurarine-loaded liposomes, the EEG pattern was transformed into a multiple-spike complex, eventually becoming transformed into high-amplitude (300-400 μV) paroxysmal discharges. Essentially similar changes in the EEG were obtained with direct injection of tubocurarine into the cerebral ventricles. Intravenous administration of tubocurarine (5 mg/kg) did not alter the EEG. These observations were taken as an indication that encapsulation of tubocurarine into liposomes represents an efficient means of delivering certain agents across the blood-brain barrier. Figures 1; references 13: 4 Russian, 9 Western.

UDC 615.214.31:547.466.3].076.9

Antihypoxic Characteristics of GABA-Containing Vitamin Derivatives

18400483C Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 52 No 1, Jan 89 (manuscript received 8 Jan 88) pp 56-58

[Article by A. L. Karayev, M. A. Kovler, V. M. Avakumov, V. M. Kopelevich, L. N. Bulanova and V. I. Gunar, All-Union Scientific Research Institute of Vitamins, Moscow]

[Abstract] Outbred male mice (weighing approx. 20 g) were employed as test animals to assess the protective effects of a series of GABA-derivatized vitamins in normobaric hypoxic hypoxia (produced by placing the animals in an 80 cu. cm. vessel), hemic hypoxia (produced by the administration of 400 mg/kg sodium nitrite, i.p.), and histotoxic hypoxia (20 mg/kg sodium nitroprusside, i.p.). The antihypoxic properties were studied because the antihypoxic effect serves as an important indicator of nootrophic properties in the first stage of screening of potential medicinal substances. Evaluation of the survival times demonstrated that, in terms of effectiveness, when administered 60 min before the induction of the hypoxic state, the test agents ranked as follows: pyridoxal phosphate-GABA > pantogam (Ca homopanthothenate) > picamilone (Na nicotinoyl-GABA) > Na homopanthothenate > GABA. These observations suggested that the mechanisms of action were quite similar for the different compounds, with the efficacy of the derivatives exceeding that of GABA as a result of, presumably, their greater penetration of the blood-brain barrier. References 9: 7 Russian, 2 Western.

UDC 616.94-022.7:579.861.2]-008.6-085.31:547.473.2'133

Effects of Sodium Hydroxybutyrate on Development of Staphylococcal Intoxication

18400483D Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 52 No 1, Jan 89 (manuscript received 17 Feb 88) pp 90-93

[Article by G. Ye. Brill, Chair of Pathologic Physiology, Saratov Medical Institute]

[Abstract] The entry of pathogenic staphylococci into systemic circulation is accompanied by profound changes in central hemodynamics and disturbance of tissue perfusion, even to the point of exotoxic shock. The demonstration that activation of GABA-ergic systems is a key mechanism in the prevention of a lethal outcome in cases of staphylococcal intoxication led to an assessment of the role of γ-hydroxybutyrate in the development of staphylococcal intoxication, since it is one of the major metabolites of GABA. Studies on mice and cats demonstrated that intravenous administration of various doses of sodium hydroxybutyrate (HB) before, with, and after intraperitoneal injections (in mice) or intravenous injections (in cats) of lethal doses of the staphylococcal toxin resulted in statistically significant improvements in the survival rates. Evaluation of cerebral circulation and blood rheology led to the conclusion that the efficacy of HB was due to its beneficial effects on circulatory parameters. Control cat studies demonstrated that within 90 min of toxin administration, brain stem blood flow decreased by 66%, falling to 26% after 2 h and remaining at that level until death. Administration of HB reversed these changes, leading to a 30% increase within 30 min. Rheologic studies demonstrated that HB is also effective in overcoming toxin-mediated hypercoagulation. These findings demonstrated in mice and cats that doses of 200-400 mg/kg HB were effective in prolonging life in toxin-treated animals presumably as a result of maintaining adequate bulbar circulation. The latter was at least in part attributed to the penetrability of HB across the blood-brain barrier. Figures 1; references 13: 11 Russian, 2 Western.

UDC 615.31:579.861.2

Chemotherapeutic Effectiveness of B-40 Preparation in Experimental Staphylococcal Infection

18400509D Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 51 No 1, Jan-Feb 89 (Manuscript received 15 Dec 87) pp 95-97

[Article by S. I. Pavliy, V. V. Danileychenko, Ya. G. Kishko, N. N. Romanov, Lvov Medical Institute, Institute of Microbiology and Virology, Ukrainian Academy of Sciences, Kiev]

[Abstract] A study is presented of the chemotherapeutic value of the broad-spectrum antibiotic preparation B-40, a derivative of phenylimidazothiazole. Experiments were performed on 120 BALB white mice, infected with the standard strain *Staphylococcus aureus* 209P. After intraperitoneal infection, acute generalized septicemia developed in all the mice. A single intraperitoneal administration of B-40 within 24 hours after infection reduced the death rate from 50% to 0. Further studies are needed of the therapeutic properties of the preparation for other bacterial infections, to determine the mechanism of its action in the preclinical test stage. References 7 (Russian).

UDC 577.182.54'17:615.277.3

'Chimeric' Antibiotics—Daunorubicin and Its Analogues N-Acylated by Bruneomycin (Streptonigrin)

18400529 Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 15 No 2, Feb 89 (Manuscript received 18 Jul 88) pp 277-280

[Article by V. V. Tolstikov, N. V. Kozlova, I. V. Yartseva, M. N. Preobrazhenskaya, All-Union Scientific Research Institute for the Development of New Antibiotics, USSR Academy of Medical Sciences, Moscow; All-Union Oncologic Science Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] It was recently shown that the antitumor antibiotic bruneomycin (streptonigrin) (I) is a highly effective inhibitor of HIV reverse transcriptase. An obstacle to the use of the antibiotic against the virus is its high toxicity. Streptonigrin amide and some of its derivatives have been found to be less toxic and less active than the initial antibiotic. The purpose of this study was to determine whether it is desirable to acylate the amino group of biologically crucial compounds with a bruneomycin residue in order to achieve activity in the derivatives as a result of the introduction of the pharmacophor or in order to subsequently liberate the bruneomycin in certain organs and tissues. Bruneomycin amides were obtained using the highly active antitumor antibiotics daunorubicin (IIa), doxorubicin (adriamycin) (IIb) and carminomycin (IIc) as the amino components. N,N'-dicyclohexylcarbodiimide was used as the condensing agent. Tests in a *Bacillus subtilis* cell culture showed the IIIa-c and the IV compounds that were synthesized to have no biological activity. The "chimeric" antibiotics (IIIa-c) are not toxic for mice at 20 mg/kg, the LD_{50} for the least toxic of the initial substances, daunorubicin (IIa). This indicates that the amides obtained do not break down in vivo or in vitro in biological systems and their interaction with the receptors is hindered. Further studies in this area should be in the direction of synthesis of derivatives in which bruneomycin and the pharmacophor are separated by a spacer allowing interaction of the molecule with the receptor or splitting by some means in the body that which is needed to manifest biological action. Figures 1, references 5: 1 Russian, 4 Western.

Mar-Apr UDC 615.221.015.1:612.825.014].076.9

Effects of Corazole on the Dynamics of Redox Processes in Neurons of the Cerebral Cortex

18400544 Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 52 No 2, Mar-Apr 89 (manuscript received 11 Mar 88) pp 30-33

[Article by G. A. Sofronov, M. G. Alekseyev and M. O. Samoylov, Military Medical Academy imeni S. M. Kirov; Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences, Leningrad]

[Abstract] To further define the mechanism of action of corazole, a CNS stimulant, intra vitam studies were conducted on the redox profile of the pyramidal neurons in the motor cortex of cats following microionophoretic application of the drug to the target sites. Corazole application was followed by convulsive-type EEG recordings within 15-30 sec, with contact microscopy and spectrophotometry revealing marked fluctuations in the intracellular levels of reducing equivalents. Time-course analysis showed that maximum fluctuations occurred within 5 min of corazole application. An increase in the reducing equivalents of 18-23% was seen at 2 and 4 min, sharp drops were evident at 3 and 5 min, and a gradual increase in the concentration of the equivalents occurred between 5 and 15 min. The mean increase in the concentration of the reducing equivalents at 15 min was 38%. Elevation of the reducing equivalents coincided with convulsive-type electrical discharges. Application of corazole to the neuropil and neuroglia yielded essentially comparable results. The stable accumulation of intacellular reducing equivalents over a prolonged period (5-15 min) is indicative of pronounced metabolic imbalance leading to impaired neuronal function. In addition to the obvious evidence of cellular acidosis, excess formation of free radicals and lipid peroxidation are also probable factors in the pathogenetic mechanisms of corazole. Figures 3; references 14: 6 Russian, 8 Western.

UDC 615.277.3.015.4.076.9:543.42.062

TLC and Mass Spectrometric Studies on Thiodipin Metabolism in Rats

18400558A Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 23 No 3, Mar 89 (manuscript received 3 Mar 88) pp 267-270

[Article by V. V. Chistyakov, O. S. Anisimova, Zh. F. Presnova, V. A. Chernov, Yu. N. Sheynker and T. S. Safonova, All-Union Scientific Research Institute of Pharmaceutical Chemistry imeni S. Ordzhonikidze, Moscow]

[Abstract] TLC and mass spectrometry of urine and fecal samples were used to assess the metabolism of thiodipin (1,4-bis[N,N'-di(ethylene)thiophosphamide]piperazine), a water-insoluble antineoplastic that is active via the peroral route, in outbred male (120-140 g) rats. The data demonstrated that, following peroral administration of 100 mg thiodipin in 1% starch gel with Tween-60, most of the metabolites were eliminated over a 6-24 h period. Elimination via the gastrointestinal tract consists of products of incomplete and complete sulfooxidation, and via the kidneys as β-chloroethylamide dipin derivative. The absence of thiodipin in urine indicated that sulfooxidation proceeds rapidly once thiodipin is absorbed in the gastrointestinal tract. Figures 3; references 7: 6 Russian, 1 Western.

UDC 615.214.3:547.745].015.4.07

Topological Proline Analogs of Piracetam and Their Nootropic Activity

18400558B Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 23 No 3, Mar 89 (manuscript received 24 Dec 87) pp 276-281

[Article by T. A. Kudasheva, R. U. Ostrovskaya, F. V. Maksimova, A. V. Chuppin, S. S. Trofimov, V. P. Lezina, T. A. Voronina and A. P. Skoldinov, Institute of Pharmacology, USSR Academy of Medical Sciences, Moscow]

[Abstract] Theoretical structure-activity studies were conducted to determine the nootropic activity of proline analogs of piracetam, a well-established CNS stimulant. The study was based on the hypothesis that piracetam represents an exogenous analog of an unopened endogenous peptide ligand reacting with a putative nootropic receptor, i.e., a piracetam receptor. Accordingly, a series of N-acyl derivatives of L-proline and N-carbamidomethyl-L-proline amides were synthesized and tested in a learning model on outbred male rats (180-200 g), using intraperitoneal administration of the test compound 15 min before conditioned passive avoidance trials. The resultant data suggested that the peptide bond of the endogenous ligand, formed by the N-end of pyroglutamic acid, has the cis-conformation in the ligand-receptor complex. The functional groups of the second amino acid fill the cavity in the center of the binding site and evidently form an intramolecular hydrogen bond wih the NH group of the pyrrolidone ring. This hydrogen bond may be expected to be important in the stability of the cis-conformation of the peptide bond. Data on the topology of the hypothetical nootropic receptor may eventually facilitate a search for novel nootropic agents. Figures 2, references 16: 9 Russian, 7 Western.

UDC 615.281.8:547.759.32].012.1

Antiviral Activity of 1-Amino-1,2,3,4-Tetrahydrocarbazoles

18400558C Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 23 No 3, Mar 89 (manuscript received 14 Jan 88) pp 299-302

[Article by T. V. Akalayeva, A. I. Bokanov, P. Yu. Ivanov, I. S. Nikolayeva, T. V. Pushkina, A. N. Fomina

and V. I. Shvedov, All-Union Scientific Research Institute of Pharmaceutical Chemistry imeni S. Ordzhonikidze, Moscow]

[Abstract] Reaction of ketocarbazoles with primary amines to obtain 1-iminotetrahydrocarbazoles and their subsequent reduction to amino compounds led to the synthesis of 20 ATHC compounds that were tested for antiviral activity. Tissue cultures and mice were used to assess the compounds against herpes simplex type 1 virus and against influenza A virus as representatives of DNA and RNA viruses, respectively. Seven of the compounds were found to inhibit reproduction of herpes simplex in tissue culture with a chemotherapeutic index approaching a value of eight. In addition, one compound was active in vivo against both viruses. Virus inhibition was found to be affected by the type of substituent groups on the heterocyclic ring, suggesting the need for further studies on structure-activity parameters. Figures 3, references 6: 3 Russian, 3 Western.

UDC 615.281:578]:547.7].07

Algorithmic Search for Antivirals Among N- and S-Heterocyclic Compounds

18400558D Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 23 No 3, Mar 89 (manuscript received 3 Mar 87) pp 310-314

[Article by S. K. Kotovskaya, L. A. Tyurina, Ye. Yu. Chernova, G. A. Mokrushina, O. N. Chupakhin, A. P. Novikova and V. I. Ilyenko, All-Union Scientific Research Technological Institute of Herbicides and Plant Growth Regulators, Ufa; Ural Polytechnical Institute imeni S. M. Kirov, Sverdlovsk]

[Abstract] An algorithmic study was conducted on the structure-activity parameters of NS-heterocyclic compounds with a view toward defining data that would be useful in the design of antiviral agents. The approach was based on the analysis of 40 compounds with known antiviral activity against influenza B and on 37 lacking such properties, encompassing benzimidazoles, thiazoles, pyridotriazoles, and thiadiazines. The analysis encompassed 37 descriptors and led to the identification of the following as favoring antiviral activity: N_c-C=N-C=N (N_c = cyclic N), C=N-C-N-Ar, C=N-C=N-C=C, $(CH_2)_n$, N_c-$(CH_2)_n$, N_c-$(CH_2)_n$-O, SCH_3, N=C-SCH_3. In addition, groups exerting a negative effect were also identified: e.g., Ar-O, Ar-OH, and Ar-C=C-C=N in the case of thiazoles with polyphenol substituents, N_cH and Ar-N_c in benzimidazoles unsubstituted at positions 1, 5, and 6, and N_c-C=N-CH_3 pyrazole substituent on benzimidazole and thiazole. Additional factors that came to light included the fact that the HBr and HI salts displayed greater activity than the HCl salts. On the basis of these considerations, novel agents were designed with putative activity against influenza B virus with 80% probability of activity. References 12: 11 Russian, 1 Western.

UDC 615.2/.3.015.154.07

Means and Methods of Prolonging the Effect of Medications (Status of the Question and Prospects)

18400588 Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 52 No 2, Mar-Apr 89 (manuscript received 25 Oct 88) pp 5-15

[Article by S. N. Golikov, G. A. Guryanov, and V. K. Kozlov, Institute of Toxicology, USSR Ministry of Health, Leningrad]

[Abstract] This review of the Soviet and Western literature discusses methods for prolonging the effects of medications. Methods discussed include microencapsulation of medications, chemical methods of prolonging effects, and physical-chemical methods. The authors address the question of the influence of structural rigidity of cholinolytics on the dissociation of their complexes with m-cholinoreceptors. High receptor affinity may be seen in cholinolytics with flexible molecules (such as atropine and AF-43) as well as in more rigid analogues (Af-32 and Af-41). Increasing the rigidity of molecules blocking specific receptors is one possible method of prolonging their biological action. The immunological method of prolonging the action of medications is also discussed. A drug in a complex with specific immunoglobulins may form a depot of the drug in vivo, resulting in prolonged action. Figures 1, references 108: 40 Russian, 68 Western.

UDC 615.281:547.439

Synthesis and Bactericidal Properties of Ferrocene- and Silicon-Containing Diacetylene-Series Alcohols

18400589 Tbilisi SOOBSHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian Vol 103 No 3, Mar 89 (manuscript received 24 Dec 87) pp 633-636

[Article by L. P. Asatiani, Z. Sh. Lomtatidze, G. N. Shatirishvili, T.G. Shiukashvili, Tbilisi State University]

[Abstract] In synthesizing ferrocene- and silicon-containing acetylene-series alcohols and studying their bactericidal properties, the authors studied the interaction of dibenzoylferrocene and metal derivatives of silicon acetylenes. The substances tested were found to have bactericidal and actinomicidal properties. They suppress the growth and development of X. anthomonas campestris, P. ectobacterium aroideae and N. ocardiophsis dessonvillei, but have no influence on S. treptomyces spp. One of the two substances tested also suppresses the growth and development of Bacterium tumefaciens. References: 2 (Russian).

UDC 615.849.2.015.25].012.07

Screening Fluorene Derivatives for Radioprotective Agents

18400598B Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 23 No 4, Apr 89 (manuscript received 22 Aug 88) pp 437-440

[Article by G. G. Vatulina, T. N. Tuzhilkova and A. I. Bokova]

[Abstract] Screening studies were conducted with 15 fluorene derivatives, including six novel compounds, to determine whether this class of compounds has potential applications as radioprotective agents. The studies were conducted on male and female C57Bl/6 mice (18-20 g) gamma irradiated with an $LD_{95-99/30}$ dose. Prior to irradiation the animals were injected with one-third LD_{50} of the compound being tested and the 30-day survival rate monitored. The compounds in question had low toxicity with LD_{50} values in the 200 to >2000 mg/kg range. Ten of the agents evidenced radioprotective efficacy (30% to >50% 30-day survival rates). Found to be the most beneficial (50-60%) were 2-aminofluorene, fluorenone, and 2-benzoylfluorene in doses of 130, 500, and 500 mg/kg, respectively, when given 25-30 min before irradiation. These findings indicate that the fluorenes deserve closer attention as putative radioprotective agents. Figures 1; references 14: 8 Russian, 6 Western.

UDC 616.12-022.7:579.861.2]-092.9

Mechanism of the Effect of Staphylococcal Toxin on the Heart

18400401a Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA in Russian No 6, Nov-Dec 88 (manuscript submitted 17 Apr 87) pp 45-48

[Article by G. Ye. Brill, Department of Pathological Physiology, Saratov Medical Institute]

[Abstract] Staphylococcal-related injury to the heart is a frequently encountered complication of infectious diseases and profound reconstructive heart-valve surgery. The damage is done primarily the protein toxin produced in the environment. The toxin evokes specific morphofunctional changes in sensitive cells and tissue, especially the heart. Because researchers are still unclear about what points in the pathogenic action of the toxin are mediated by disturbances of neurohumoral regulation and about what the toxin's direct effect is on the cells of the myocardium and the pacemaker structures, this researcher studied the direct effect of the staphylococcal toxin on the heart. Experiments were conducted in the autumn and winter on an isolated, spontaneously contracting frog heart (*Rana ridibunda*) and on an isolated strip of myocardium 5-6 mm long and no more than 1 mm in diameter. The researcher found that a 30-minute perfusion of the heart with a Ringer solution containing the toxin in a dilution of 1:160 led to an increase in amplitude of around 22% ($p < 0.001$), with no changes in rate of heartbeat. The values for contraction V_{max} climbed by roughly 37%; those for relaxation, by about 22%. Raising the toxin concentration to 1:40 increased the amplitude and V_{max} of contraction in the first few minutes only; after 30 minutes, they returned to baseline levels. V_{max} of relaxation, however, dropped by about 13%. A concentration of 1:20 produced a reduction in amplitude of contractions of around 38% of baseline. After a brief rise, contraction V_{max} dropped by roughly 66%; relaxation V_{max} fell by some 70%. In a number of experiments, pacemaker activity stopped completely. Experiments with the strip showed similar dose- and time-related effects on the nature of the toxin's action. The positive effects of the small toxin doses suggest that the toxin frees catecholamines from endogenic reserves, which prompted the researcher to also study the effect of the toxin on the myocardial strip when α- and β-adrenergic receptors are blocked by phentolamine and propranolol, respectively. A 20-minute perfusion of the strip with a Ringer solution containing those preparations resulted in a 17% decrease in amplitude of contractions. Adding the toxin in a 1:160 dilution increased the amplitude by roughly 20%, the contraction V_{max} by about 17%, and the relaxation V_{max} by about 12%. The blockade of the adrenoreceptors did not preclude the effect of low concentrations of the toxin on the heart. High toxin concentrations suppressed the contractile function of the myocardium and the relaxation process considerably. Figures 3, references 8: 3 Russian, 5 western.

UDC 616.1/.8—008.939.633.2]-02:612.766.2]-07

Restoring Organ Mass and Nucleic Acid Content After Prolonged Hypokinesia

18400401a Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA in Russian No 6, Nov-Dec 88 (manuscript submitted 02 Apr 87) pp 59-63

[Article by F. Z. Meyerson, N. A. Fomin, V. I. Pavlova, and D. Z. Shibkova, Laboratory of the Pathophysiology of the Heart, Institute of General Pathology and Pathological Physiology, USSR Academy of Medical Sciences, Moscow; Department of Physiology and Anatomy, Chelyabinsk Pedagogic Institute]

[Abstract] Lengthy hypokinesia in young animals is known to stop growth completely. The dynamics of the restoration of body mass and the mass of certain vitally important organs after the cessation of hypokinesia, however, are still unclear. That is primarily because researchers have failed to clearly differentiate the concepts of "cessation of growth" and "reduction in growth of the body." They have also failed to clearly isolate organ DNA and RNA content from concentration per unit of organ mass. For that reason, these researchers subjected 450 two-month-old male Wistar rats to hypokinesia for 60 days. Sacrificing the rats at various stages of the isolation period and the restoration period that followed, they studied the DNA and RNA content of brain, heart, liver, pancreas, and thymus tissue with a method reported by Schmidt and Thannhauser (J. BIOL. CHEM., 1945, Vol 161, pp 83-89). DNA and RNA quantities were determined with a spectrophotometer and expressed in milligrams per organ. In and of itself, hypokinesia did not result in a loss of body weight, but it did completely halt normal physiological growth. That growth resumed slowly after the hypokinesia was ceased, but one month after the cessation of the hypokinesia, the body weight of the experimental rats was some 15% below that of the control rats. Similar dynamics were witnessed for the heart. The hemispheres of the brain, however, continued to grow during the hypokinesia, with only slight suppression of growth evident, and they eventually reached the control levels. The hypokinesia resulted in a 20-30% loss of mass in the gastrocnemius and the liver and a 50% loss in the thymus. The liver and the thymus later regained enough mass to achieve control levels, but the gastrocnemius 20% below control. The relatively fast weight gain exhibited by all the organs suggests that the principal factor determining growth and cell division is the number of genomes in the organ. With the exception of the hemispheres of the brain, the content of the genetic matrices of DNA and RNA is usually a function of the motor activity of the body, with hypokinesia resulting in a complete cessation of DNA

and RNA accumulation in the heart and a partial reduction in the liver and the thymus. DNA was quickly restored when the hypokinesia was ended. Heart and skeletal muscle RNA content was found to drop somewhat more than did DNA during the hypokinesic period. During the restoration period, RNA levels rose more rapidly. Figures 2; references 8: 7 Russian, 1 western.

UDC 616.8-009.7-092:612.884.064:612.419.015.2

Analgesic Effect of Various Fractions of Supernatant of Bone Marrow Cell Cultures in Pathological Pain

18400402a Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 106 No 12, Dec 88 (manuscript submitted 15 Jun 88) pp 653-655

[Article by V. N. Grafova, Ye. I. Danilova, L. A. Zakharova, and A. A. Mikhaylova, Scientific Research Institute of General Pathology and Pathological Physiology, USSR Academy of Medical Sciences; Institute of Immunology, USSR Ministry of Health, Moscow]

[Abstract] The bioregulatory peptides called myelopeptides, which are functionally heterogeneous, are synthesized in human and animal bone marrow. Such peptides have an immune-stimulating effect on various immunocompetent cells and have an analgesic effect that is produced through the opioid receptors. The analgesic action of myelopeptides show up in the pain syndrome caused by the creation of a generator of pathologically amplified stimulation in the posterior horns. The authors evaluate the analgesic action of substances that make up various fractions of the supernatant of bone marrow cell cultures, and they compare their analgesic action with that of Myelopid. Myelopeptides were taken from the supernatant of cell cultures of the bone marrow of pigs. Three fractions were obtained: the first, with a molecular weight of >2.0 kD; the second (myelopid), with a molecular weight of 2.0 kD; and the third, with a molecular weight of <1.0 kD. Male mongrel rats were injected intraperitoneally with the three fractions in doses of 1-10 mg protein per kilogram of animal body mass. In separate experiments, animals were injected intraperitoneally with the supernatant concentrated 10-fold in a volume of 0.5-1.0 ml. Control animals were injected with the same volume of saline. The bone marrow cells were found to produce a group of substances that had a wide range of molecular weights (0.3-150.0 kD), that had an analgesic effect, and that suppressed severe pain syndrome of spinal origin. It is possible that the high-molecular substances that are contained in the first fraction and that have analgesic properties are precursors of low-molecular bone-marrow peptides. Unlike myelopid, the bone-marrow peptides produced analgesia in extremely low concentration, regardless of molecular weight. An important property of the myelopeptides is the absence of myelorelaxing or narcotic effects. Figures 2, references 10 (Russian).

UDC 579.852.11

Increase in Transforming Activity of Plasmid DNA by its Inclusion in Interpolyelectrolyte Complex With Carbon Chain Polycation

18400457c Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 306 No 1, May 89 (manuscript received 2 Dec 88) pp 226-229

[Article by A. V. Kabanov, V. I. Kiselev, M. L. Chikindas, I. V. Astafyeva, A. I. Glukhov, S. A. Gordeyev, V. A. Uzumrudov, A. B. Zezin, A. V. Levashov, Ye. S. Severin, and Academician V. A. Kabanov, Institute of Applied Molecular Biology, Moscow; Moscow State University imeni M. V. Lomonosov]

[Abstract] Increased permeability of biologically active macromolecules through cell membranes represents one of the more important areas in contemporary biotechnology and medicine. To impart transmembrane properties to water soluble proteins, a hydrophobic "anchor" needs to be introduced into a molecule (fatty acid residue, for example) which then binds the protein to a membrane and facilitates the translocation. For the isolated nucleic acids to penetrate inside a cell, they also must be first bound to the membrane by hydrophobization. In nucleic acids which represent linear polyanions with a high charge-density, chemical modifications are required, however. The goal of this study was to verify this approach of imparting higher permeability of nucleic acids through cell membranes. Formation of polycomplexes of DNA phage λ with a blocking polycation of poly-N-ethyl-4-vinylpyridinium bromide was studied showing that soluble nonstoichiometric polyelectrolytic complexes were formed under the conditions studied. A polycation bound to DNA did not prevent its specific "recognition" of restrictase. This method of hydrophobization of nucleic acids may be universal, assuring transmembrane transfer of genetic material into target cells. Figures 3; references 15: 7 Russian, 8 Western.

UDC 615.322:582.982:547.918].015.42:612.45.015.348:-547.295.96

Stimulation of Arachidonic Acid Synthesis in Rat Adrenal Glands by Cucurbitacin R

18400505a Moscow PROBLEMY ENDOKRINOLOGII in Russian Vol 35 No 2, Mar-Apr 89 (manuscript received 6 Jan 88) pp 70-74

[Article by A. G. Panosyan, M. A. Dadayan and G. A. Gevorkin, Scientific Research Institute of Medical Radiology, Armenian SSR Ministry of Health, Yerevan]

[Abstract] To further assess the physiological mechanism of action of cucurbitacin R (CR; 2β,25-(1-O-β-D-glucopyranosyloxy)-16α,20-dihydrocucurbitene-5-trione-3,11,22), *in vivo* and *in vitro* studies were performed to assess its effects on the synthesis of arachidonic acid (AA) and 5-HETE (5(S)5-hydroxy-6E,8Z,11Z,14Z-eicosatetraenoic acid) in rat adrenal glands. Studies with isolated adrenocortical cells derived from 180-200 g outbred

male rats demonstrated that, in the presence of eicosatetraenoic acid, CR enhanced AA synthesis 1.74-fold. The stimulation with CR was greater than with the addition of ACTH (1.4-fold), while a CR + ACTH combination was synergistic (2.58-fold increase). Incubation of the cells with CR without eicosatetraenoic acid addition led to a sharp increase in 5-HETE synthesis, as was the case with ACTH. In this case CR + ACTH did not lead to a synergistic effect, although addition of exogenous AA to the incubate resulted in a better than 40-fold increase in 5-HETA synthesis. Intramuscular administration of CR (0.1 mg/kg) for 14 days induced an increase in the ratio of free AA and bound AA and in the concentration of free and cholesterol-bound fatty acids in the adrenal cortex. Similar changes changes were obtained when the animals were stressed by immobilization for 2.5 h. These observations indicated that CR-induced secretion of corticosteroids is mediated via synthesis of AA and 5-HPETE. Figures 2; references 18: 8 Russian, 10 Western.

UDC 615.356:577.175.346].015.4:[612.115.1 +612.015.1:577.152.34+612.018:577.175.85

Effects of Oxytocin on Fibrinolysis and Kallikrein-Kinin System

18400505b Moscow VOPROSY ENDOKRINOLOGII in Russian Vol 35 No 2, Mar-Apr 89 (manuscript received 24 Jul 87) pp 81-84

[Article by V. F. Kirichuk and M. B. Burova, Chair of Human Physiology, Saratov Medical Institute]

[Abstract] Rats were used in a study designed to assess the role of oxytocin in regulating fibrinolysis and the kallikrein-kinin system. Intramuscular administration of 2.5 IU/kg oxytocin to nonpregnant female Wistar rats (170-200 g) resulted in enhancement of fibrinolysis: whole blood chemistries showed activation of plasmin and plasminogen activators at 30 min and 1 h, and a concomitant inhibition of antiplasmin activity. Simultaneously, serum levels of kallikreinogen fell and the concentration of kallikein increased. After 6 h had elapsed from the time of oxytocin administration the parameters concerned with coagulation returned to baseline. Kallikreinogen, however, increased to above baseline levels and may reflect involvement of the kinin sytem in the effects of oxytocin on the myometrium. References 19: 13 Russian, 6 Western.

UDC 612.815

Post- and Presynaptic Mechanisms of Tubocurarine Recovery of Neuro-Muscular Transmission After Exposure to Organophosphorus Acetylcholinesterase Inhibitor

18400522D Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 306 No 2, May 88 (Manuscript received 4 Jun 88) pp 499-502

[Article by N. I. Krivoy, T. P. Sey, Institute of Physiology imeni A. A. Ukhtomskiy, Leningrad State University]

[Abstract] Anticholinesterase substances greatly inhibit muscular contraction at comparatively low-frequency synaptic activity (pessimal inhibition). Blocking of a portion of the nicotinic cholinoreceptors by d-tubocurarine (d-TC) eliminates the pessimal reaction even after exposure to organophosphorus compounds, which are considered to be irreversible inhibitors, among the most toxic known. This article studies the synaptic mechanisms of that phenomenon. Experiments were performed on a strip of nerve-muscle tissue from the rat diaphragm. It is found that under conditions of ACE inhibition, d-TC helps to restore neuro-muscular transmission during rhythmic activity, preventing the development of steady depolarization of the postsynaptic membrane and weakening presynaptic depression. The effects of d-TC are explained by the fact that partial blockage of postsynaptic cholinoreceptors accelerates the diffusion of acetylcholine from the synaptic slot, decreasing the probability of rebonding with the cholinoreceptor, leading to a decrease in the concentration of acetylcholine and potassium ions in the slot. This should reduce the postsynaptic potential, weakening the probable negative presynaptic effect of these substances. This is possibly supported by blockage of the presynaptic cholinoreceptors by the d-TC molecules. Figures 3; References 12: 4 Russian, 8 Western.

UDC 616-001.36-02:616-001]-085.31:[547.95:547.943]-036.8-07:616.1-008.1

Effects of Dalargin on Systemic Hemodynamics and Microcirculation in Experimental Traumatic Shock

18400540E Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA in Russian No 1, Jan-Feb 89 (manuscript received 14 Jul 87) pp 39-42

[Article by Ye. A. Donskikh and L. M. Kozhevnikova, Scientific Research Institute of General Pathology and Pathologic Physiology, USSR Academy of Medical Sciences, Moscow]

[Abstract] In view of the role of endogenous opioids in homeostasis, an analysis was conducted on the effects of dalargin, a synthetic analog of leu-enkephalin, on hemodynamics in experimental traumatic shock. The average survival time of outbred rats and hamsters in shock due to injury of a posterior extremity was 438 min. Intravenous administration of 100 μg/kg dalargin reduced the average survival time to 275 min in the case of the rats, while exerting a less telling effect on the survival of the hamsters (406 without dalargin vs. 387 min with dalargin). Hemodynamic monitoring demonstrated that in both species dalargin contributed to deterioration of systemic hemodynamics and microcirculatory parameters, although in hamsters a short-term elevation of BP by 20-30 mm Hg was observed immediately after the administration of the analog. It appears, therefore, that dalargin depresses the higher regulatory centers in

analogy to endogenous opioids, and thereby exacerbates the pathogenetic mechanisms of shock. References 7: 5 Russian, 2 Western.

UDC 616.831-02:616.15-008.6-02:617-001.17

Mechanisms of Neurotropic Action of Intermediate Molecular Weight Blood Peptides in Intact and Burned Dogs

18400540F Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA in Russian No 1, Jan-Feb 89 (manuscript received 20 May 87) pp 45-49

[Article by I. A. Volchegorskiy, B. M. Valdman, A. S. Puzhevskiy and R. I. Lifshits, Chair of Biological Chemistry, Chelyabinsk Medical Institute]

[Abstract] The demonstration in open-field trials that intravenous administration of intermediate molecular weight peptides (IMWP) derived from the blood of animals with burns alters the permeability of the blood-brain barrier and modifies behavior led to a further assessment of IMWP in terms of behavior and brain biochemistry. Mice were intravenously administered IMWP derived from dogs with burns. The changes in the searching/orientative behavior of the mice showed considerable variation in a parabolic dose-response fashion, confirming the assumption of altered blood-brain barrier permeabiltiy. In addition, determinations of brain monoamine oxidase (MAO) activity showed that IMWP led to analogous changes in MAO activity, a mechanism presumably responsible for the behavioral sequelae of IMWP administration. In addition, unlike previously reported in vitro results, the IMWP were shown to enhance lipid peroxidation. The data indicate, therefore, that the effects of IMWP on oxidative deamination of brain monoamines may determine the behavioral effects of IMWP and the encephalopathic syndrome in burns. Figures 1; references 16: 11 Russian 5 Western.

"Residual" Approach to Public Health Care and Its Consequences

18400432 Moscow POLITICHESKOYE OBRAZOVANIYE in Russian No 1, Jan 89 pp 74-76

[Unattributed article]

[Text] In order to understand the existing situation in public health care, one must consider the morbidity picture. It may tell us much.

According to Goskomstat SSSR data, influenza and acute upper respiratory infections morbidity decreased and the number of domestic traumas decreased in 1987. At the same time the level of acute intestinal diseases and of virus hepatitis remains high, as before; there are more than 2.5 million cases annually. There are more than 9000 cases of typhoid fever annually. Cardio-vascular disease is prevalent. The number of physically or mentally retarded children is increasing. The All-Union Congress of Physicians published the following figures: two thirds of the children leave elementary school with posture problems; half of the students are near-sighted by the time they finish middle school; 30-40 percent have cardio-vascular conditions and 20-30 percent have psycho-neurotic conditions.

Cancer morbidity statistics are becoming more and more worrisome. The number of hospitalized cancer patients increased from 1.5-2.8 million from 1970-1987; there were 605 and 997 patients respectively, per 100,000 persons. Part of this increase may be explained by improved diagnosis, but only part of it.

The number of chronic alcoholics and drug addicts was 4.7 million or 1.6 percent of the population in 1988, in contrast to 4.5 million in 1985.

We shall try to analyze the data presented. Reduction of morbidity applies, mainly, to infections of a cyclic nature; in one year we have virus influenza and the next year another disease; last winter the weather was bad, this year it is better. The gravity of influenza epidemics and the spread of acute respiratory diseases change accordingly. Thus, the general state of affairs in health protection does not reflect this tendency completely.

Here, morbidity caused by infections, the spread of which depends directly on the state of the environment, the quality of food products and drinking water, not only is not decreasing but is increasing. Thus, we attribute gastro-intestinal diseases not only to "dirty hands" but, primarily, to poor water supply in many populated places, to unsanitary processing of meat and dairy products and to inadequate sanitary conditions at food industry enterprises and in shops, dining rooms and cafes. According to Ministry of Health USSR data, 25 percent of the milk-processing enterprises and 30 percent of the meat-processing enterprises do not meet sanitation requirements. Practically everyone knows how literally one beach after another was closed in 1988 along the shores of the Black Sea, the Sea of Azov and the Baltic Sea and on many rivers and lakes in different regions of the country. Samples revealed a dangerous saturation of the water by microflora, coming from emission of raw sewage, which creates a health hazard.

The increase of diseases associated with different disturbances of the genetic apparatus causes special concern. This is caused, to a significant degree, by deterioration of the human environment, a complication of the ecological situation, increased use of pesticides and other toxic chemicals in agriculture and of inorganic additives to foods in the food industry, including some carcinogens. Is such "chemization" proper? We shall return to statistics.

Data of the State Committee of Statistics show: while delivery of plant protection chemicals to agriculture equalled 170,000 tons in 1970, it equalled 333,000 tons in 1987, including 50,000 and 169,000 tons of herbicides for 1970 and 1987, respectively. Agriculture used 2.7 times more mineral fertilizers per hectare of arable land in 1987 than in 1970 and 21 times more chemical fodder additives! At the same time, if you believe statistics, the yield of grain crops and vegetables increased less than 1.2 times, meat production (in slaughtered weight) increased 1.5 times and milk production increased slightly more than 1.2 times. In other words, there is both ineffective use of chemical agents and saturation of food products by products which could be hazardous to man such as the catastrophic increase of the level of nitrates in vegetables.

The press reported that the pursuit of records, beginning in the 1970s in Azerbaijan agriculture, is responsible for outbreaks of hereditary diseases now breaking out in the republic. Azerbaijan leads in the use of pesticides per hectare. The permissible sanitary norms for cotton and vegetable plantations were exceeded 10-times and those for viniculture were exceeded almost 100 times. The highly toxic pesticide, DDT, the use of which was officially forbidden in 1970, was used in Azerbaijan agriculture for some years after this. The overall mortality rate indicates the unsatisfactory state of health of the people, prophylaxis and medical assistance. In 1986-1987, there were 99 deaths per 10,000 persons. Life expectancy in the USSR was in 32nd place in the world.

Childhood mortality in 1987 was at the 1986 level at 25 children under 1 year of age per 1000 births (it was 26 children in 1985). This is a very high level which is connected, to a considerable degree, with the poor quality of obstetric care and deficiencies in organization of medical services to mothers and children. The USSR is in 50th place in the world in childhood mortality (after Mauricia and Barbados).

Childhood mortality differs significantly from one union republic to another. In 1987, the lowest levels were in Latvia (11.3), Lithuania (12.3) and Belorussia (13.4). The highest levels were in Kirghizia (37.8), Uzbekistan (45.9), Tadzhikstan (48.9) and Turkmenia (56.4).

In short, the level of health of the Soviet peoples can scarcely be said to be satisfactory. What are the causes of such a deplorable situation?

There is a persistently accelerating ignorant attitude, in our society, toward public health, which considered, and frequently continues to consider, health technocratically, only as a factor, on the state of which depends successful functioning of production and not upon the absolute social value, the highest social riches and independent entity, valuable in and of itself.

In the "residual approach" to allocation of funds and resources for development of the economic base of public health care, medical science, medical personnel training and universal physical culture, special emphasis is transferred, as usual, from prophylaxis in the broad sense of the word, including improvement of the environment, to the "immediate" elimination of harmful consequences, to the patching of all "holes" wherever they occur.

Since propagandizing of a healthy life style and inculcating high concern for their own health in people are very slightly emphasized in the USSR, there is no system of incentives which would impel a person to watch over his own health if he does not care to, since, for a long time, there was formed the ideal of man giving his entire self to business without regard for his own health.

The economic base is the most vulnerable spot in Soviet public health care. The rate of its development slowed over many years so that it is now in an extremely grave situation. It is true that turns for the better were seen recently but there has been no sudden change.

First of all, consider hospital care. Although the number of hospital beds was increased from 2.7 million to 3.7 million in 1970-1987, the rate of increase in this area was slowing. In the 9th Five-Year Plan, hospitals with 69,200 beds were put into operation annually; this figure decreased to 64,800 beds annually in the 10th Five-Year Plan and to 63,600 annually in the 11th Five-Year Plan. There was an increase of 73,000 beds in 1986 and 76,000 beds in 1987.

In 1987, there were about 131 beds per 10,000 persons in the country, on the average. The highest figures were found in Latvia (140.5) and RSFSR (135.9).

There were 3200 central regional hospitals amd 700 regional hospitals in the country in 1986. Many of these operate under completely unsatisfactory conditions. Only 35 percent of the regional hospitals have hot water; 27 percent do not have a sewage system and 17 percent have no running water.

Out-patient polyclinic care requires radical improvement. The 1987 plan for placement into operation of out-patient polyclinics was fulfilled; they were constructed for 216,000 visits per shift. This is much higher than that in 1986 (176,000) and for one year in the 11th Five-Year Plan (142,000) on the average. Nevertheless, this is not enough. Polyclinics and out-patient clinics are still overloaded; in 1986, their actual throughput exceeded the planned capacity by almost one third. Only one fifth of the 18,000 polyclinics and out-patient clinics in rural areas had specially constructed buildings.

There were 5100 first aid and emergency assistance stations (departments) in the country in 1987 as compared to 4400 in 1980. First aid brigades made 88,500,000 runs in 1987 (77,400,000 in 1980) or 313 runs per 10,000 persons (292 in 1980), giving assistance to 95,900,000 persons (85,100,000 in 1980). At the same time, the first aid service needs special transportation and means of communication, modern technology, drugs and medicines.

Sanatorium and health resort organization must be improved. In 1987, there were nearly 16,100 sanitoriums and rest homes (without one-two day facilities). More than a million places of the total number available are intended for family rest and 19,000 are intended for treatment of parents with children. About 2,600,000 rest homes for stays of one or two days with places for 188,000 persons operated in the USSR in 1987. Even this is not enough. The existing network of sanatorium and rest resorts does not meet the needs of the people. Less than one fifth of the population are treated or recuperate in them.

The level of medical assistance differs for different categories of the population. The problem of providing equal medical care in rural and urban areas is being solved slowly. In 1987, the level of provision of first aid in the rural area was 50 percent lower than that provided in urban ares. No serious changes are occurring in mother and child care. Health protection expenditures differ in different regions of the country. According to Ministry of Health USSR data, the total amount spent per person in 1985 was 70 rubles in Latvia, 68.9 rubles in Estonia, 41.8 rubles in Tadzhikstan, 44.3 rubles in Kirghizia and 54.4 rubles in Moldavia.

An extremely unfavorable situation developed in regard to the provision of medicines to hospitals and the public. The Ministry of Health USSR has reported that the need for drugs for the public health system is being satisfied by only 70 percent.

The Soviet pharmaceutical industry cannot provide the amount of drugs needed, an adequate assortment nor high quality. The fixed capital of its enterprises is extremely worn out and is operating at its limit. The facilities are almost completely loaded which does not permit them any leeway for orderly production of new drugs. About 40.7 percent of all medicines used in the USSR are purchased abroad.

A serious impediment to development of public health care is the absence of modern, reliable medical technology. Only 60 percent of the equipment needed is provided and only 30 percent of the apparatus is up-to-date. According to Ministry of Health USSR data, not even the simplest technology for introduction of medical

equipment is available: nearly 1000 operating tables, 5000 surgical lamps and 100,000 bactericidal lamps. There is a catastrophic shortage of syringes and blood transfusion systems for one-time use. The total amount of medical production in the overall industrial production is 0.5 percent for the USSR compared to 2.5-2.8 percent in the developed countries.

Important measures for improving the economic base of the public health system are now being undertaken. In spite of financial difficulties, an additional 5.4 billion rubles was found to be used for health care. In 1989, 24.8 billion rubles are being allocated for public health care; this is a 15 percent increase. Development of the network of hospitals for children, pregnant women, women in childbirth and children's homes is receiving special emphasis. In the future Five-Year Plan, there is proposed a 2-fold increase of current expenditures on public health care. The volume of capital investments is increasing from 9 billion rubles in the current Five-Year Plan up to 25 billion in the next Plan. Transfer to hospitals of different kinds of "prestige" objects and private residences promotes the strengthening of the economic base of the public health system. In Uzbekistan, where 46 percent of the hospital are housed in premises which do not meet minimum sanitation and hygiene requirements, nearly 400 buildings, built by Party and government institutions, have been transferred. This permits the provision of 10,000 beds, primarily for children.

The politbureau of the Central Committee CPSU decreed a reprofiling of "Rus" sanitorium of the Administration of Affairs of the Central Committee CPSU in the Moscow region creation, on its site, of a rehabilitation center for warrior-internationalist. One of the Administration of Affairs of the Council of Ministers USSR rest homes is being converted for treatment of invalid children.

One of the most acute problems, as before, remains the problem of medical personnel. The problem is not so much in the number of persons as it is in their professional training and their humane and spiritual qualities.

In 1987, there were 1,232,000 physicians (997,000 in 1980). The number of middle medical personnel was 3,295,000 persons (2,814,000 in 1980), but there still is a need for more medical workers.

The number of medical personnel available is as follows. In 1987, there were 433 physicians and 1160 middle medical personnel per 100,000 persons. The greatest availability of physicians is in Georgia (567) and Latvia (493) and the lowest is in Tadzhikistan (272). Latvia has the most middle medical personnel (1268) and Tadzhikistan again has the fewest (751).

In 1987, 55,900 specialists with higher medical education and 162,500 specialists with middle special medical education were graduated. At the same time, the quality of their training leaves much to be desired. Many physicians cannot make a proper diagnosis nor prescribe a proper course of treatment. Some physicians, nurses and hospital attendents are inattentive and, sometimes, neglectful of the patients and coarse in their actions. Especially intolerable are cases of blackmail and extortion, which are doubly immoral, for they involve persons who are helpless.

Although we have more physicians than any other country in the world, they are not all equally qualified, many of them, especially district physicians, are greatly over-worked. But they will not suffice and the hospitals and polyclinics will not suffice, if we ourselves do not look after own health, if we place these troubles on the "people in white coats".

Ministry of Health Decree Effect on Alma-Ata Cooperative

18400440 Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 15 Apr 89 p 3

[Article by V. Golovanov, Alma-Ata, under the "We Are Studying the Problem" rubric: "The Alma-Ata Cooperative has Proved to be a Stepchild"; first paragraph is published in boldface in a box above the title.]

[Text] **On the facade of the Kazakh Scientific Research Institute of Oncology and Radiology building the garnish sign "Diagnost Cooperative." attracts the attention of passers-by. It occupies a wing of the ground floor of the institute. At first glance it is an ordinary medical institution. It has a registry window, doctors' consulting rooms, and a queue of patients wait on chairs placed along the corridor.**

And at the same time the Diagnost institution is somewhat unlike other outpatient clinics; it operates on cooperative principles. The patients, after first paying 10 rubles to the cashier, pay a visit to the doctors. An if an examination or medical treatment is required, it is necessary to cough up additional money. It is agreed that the situation is somewhat extraordinary. We were used to having the state be concerned about our health, and therefore care is free. And suddenly for you—you pay out for visit, examination, or medical treatment. Is this nonsense?

We shall not make hasty conclusions. Let us examine the activity of Diagnost more closely. The cooperative was founded a year ago. About 25,000 patients from all parts of the republic have been served during this time. An especially large influx of patients has come from the rural oblasts. Twenty-five thousand is an impressive number. It gives one much to ponder. An what makes one ponder most of all, obviously, is that the level of the medical service and the skill of doctors do not satisfy the patients where they live. Otherwise, why would they waste time and money going to metropolitan doctors?

Probably the patients go to Alma-Ata because they have heard of the solid professional education of the Diagnost staff. And in reality, experienced specialists who know their profession thoroughly have been selected here. Therapeutist-cardiologist Prof. L. Kulkina, neuropathologist Prof. U. Akhmetov, surgeon Prof. S. Urashev, gastroenterologist V. Afuksinidi, and urologist V. Kogan are not occupied with authority in medical circles. If you please, the popular reputation literally at lightning speed spreads to the cities and villages to bring news about some miraculous, if one can call it that, cure. In truth, often such rumors are excessively exaggerated. What is to be done—when it is a question of health, people are ready to set their hopes on a miracle. But this is the situation, in truth, and the doctors at Diagnost are indeed competent.

Patients from Dzhezhazgan, Kzyl-Orda, Taldy-Kurgan, Semipalatinsk, East Kazakhstan and other oblasts of the republic come to see the doctors. Letters even arrive from Sakhalin and from the Magadan Oblast. People are interested in how they may get an appointment. It is possible that here some patients hold the opinion that the further away the doctor, the better he is.

We tried to find out from the patients the reason why they go to Alma-Ata to doctors from the cooperative. The responses in general were similar.

"You go to visit an outpatient clinic where you live," said a Diagnost patient, "you begin to tell the doctor about your illness, but every now and then he glances at his watch: it is obvious to everyone that he does not have time to listen to the patient attentively."

These complaints have deep significance. Indeed, in the distant past wise men said with some truth, "And the word cures." A person goes to the doctor hoping for an attentive and sensitive relationship, hoping that he will be listened to and understood, and that he will be advised about healing and keeping his health. No, No, we do not intend to cast aspersions on all doctors, the majority of whom serve their profession with dedication. But they are placed within strict limits at the state outpatient clinics. A standard of 7 to 12 minutes is allowed per patient visit. It is obvious that it is difficult in such a miserly period of time to make a serious examination and have a thorough discussion with the patient. Therefore, when you are at an outpatient clinic, you observe that doctors are constantly writing something during the visit. Would it not be interesting to find out what documentation they are formulating?

But at Diagnost the time for a visit is practically unlimited. The patient has the opportunity to tell about his ailments at length and to communicate the symptoms of the illness in detail. It is believed that this plays a far from last role in the growing popularity of the medical cooperative. Leaf through the book on complaints and suggestions—in it are written numerous appreciations to its personnel.

A Rents writes, **"I want to express my enormous gratitude to the surgeon S. Urashev for establishing a precise diagnosis and for advice for treatment, and, in addition, for sensitivity and attentiveness, and for cordiality and humanity. A genuine doctor must be like this! I thank him!"**

T. Demyanenko, A. Korshun, O. Yanson, and R. Bogodist left this entry, **"We are grateful to neuropathologist L. Kim for an attentive and sensitive relationship to patients, for good therapy by means of acupuncture, due to which our health has drastically improved."**

Many pages of the book are filled with such appreciations. There is also a note in which the patient expresses dissatisfaction with a protracted examination. But this complaint is the only one.

Medical cooperatives are only just groping their way and in practice are experiencing the organizational stage. According to KaSSR Ministry of Health, a few more than fifty of them have been established in the republic. Today many questions about their activity require an answer. What is the model of a medical cooperative? Who is obliged to provide its apparatus, medicines, and reagents?

These are far from idle questions, which are graphically apparent in the example of Diagnostik. As it has already noted above, it is functioning on a base of the Kazakh Scientific Research Institute of Oncology and Radiology. Because it leases space and apparatus necessary for examining patients, it has introduced the corresponding payment. Moreover, the doctors of the cooperative keep hours beginning at 5:00 p.m., when the apparatus of the scientific research institute is not fully being used. It is used more efficiently in this way.

It would seem that such a thrifty approach in general should be welcomed: the patients from the oblasts of Kazakhstan and from faraway remote places receive the opportunity to have a thorough examination. But here the decree of the USSR Ministry of Health No 785, "The Order of the Use of Expensive Medical Equipment" has become a barrier in the path of the doctor cooperative. And the Alma-Ata city administration has reacted exceedingly vigorously—it has prohibited the use of the apparatus.

The decree of the USSR Ministry of Health has evoked a number of critical articles in the press. In particular, the newspaper IZVESTIYA came out strongly against the Ministry of Health's removal of the cooperative from the diagnostic equipment. For different reasons, expensive medical apparatus today is used only 40-50 percent of the time. This is approximately the situation which has arisen in the medical institutions of Kazakhstan. And, indeed, cooperatives of the Diagnost type raise this indicator considerably. But their position has been substantially aggravated since the ministerial decree. Previously, they were treated like poor relations, but now they were back at square one. The question arises, does such

an arrangement really promote the cause of improving the protection of the health of working people? Of course not!

Public opinion forced the USSR Ministry of Health to publish a new decree and to make some relaxations for the cooperatives. The managers of the medical institutions were permitted to use diagnostic and medical apparatus to render paid assistance to self-supporting [khozraschet] institutions and to medical cooperatives by differentiating the amounts of rent. Diagnost proposed to the board of directors of the Kazakh Scientific Research Institute of Oncology and Radiology that the rate for operation of equipment be increased from 8 to 20 percent. The compensation is rather considerable. In any case, it is completely sufficient when it is necessary to repair and even purchase new equipment. But the first decree of the ministry, however, remains in force! What is to be done? In particular, we posed this question to G. G. Urmurzina, depute minister of the KaSSR Ministry of Health.

Gulshar Gozizovna Urmurzina replied, "Let the cooperative negotiate with the Scientific Research Institute of Oncology and Radiology."

It happens that the vital activity of the cooperative wholly and completely depends on the arrangement of the managers of the Scientific Research Institute. If it wishes, it authorizes the use of the equipment; if it doesn't wish, nothing can be done.

Recently we made quite a few good decisions about the development of the cooperative movement. But frequently, they are not supported by positive help from the department. Because of the weak material base, many cooperatives, including medical, cannot develop work properly.

Zh. Isabekov, president of the Diagnost cooperative heatedly complained in a conversation.

"Because of complications which have arisen recently in diagnostic apparatus, we need to curtail the volume of patient care. Recently, even staffs were reduced—a necessary measure."

The cooperative is ready to acquire equipment by its own means. But who will select it? Perhaps it will the republic production-trade association Medtekhnika?

"And we would help, but for Medtekhnika there is no such possibility," says R. Subbotin, deputy director. "The order of the state medical institutions are filled by not more than 60 percent."

What, then, is the result? Activists of the public health cooperative movement believe that it is necessary to establish state-cooperative institutions. Joint commitments between medical institutions and cooperatives must be clearly specified in agreements. Most of all it is a matter of cooperatives having the opportunity to use the equipment available at outpatient clinics. It is to be used after the end of the work day, at the time the clinic is beginning. And finally, it is not to be free. The advantage here is mutual. But most of all, the advantage is for those who need medical treatment.

Diagnost has achieved considerable popularity. And it would be well for the KaSSR Ministry of Health and the city health department to provide help and support for it. Today the cooperative critically needs it.

Increase in Salmonellosis Incidence

18400580 Moscow ARGUMENTY I FAKTY in Russian No 27, 8-14 Jul 89 p 8

[Commentary by A. Kondrusev, USSR deputy minister of health and USSR chief state health physician, in response to a question posed by ARGUMENTY I FAKTY correspondent, under the rubric "Last Week, 8,768 Questions Came in to the Editor"; first paragraph is the question as it was originally posed by the reader; second paragraph is source introduction]

[Text] **We have been hearing a lot about outbreaks of salmonellosis recently. What kind of illness is this, and how can one avoid it?**

In response to this question, our correspondent I. Shamshina interviewed USSR Deputy Minister of Health and Chief State Health Physician of the USSR, A. Kondrusev.

In recent years, the incidence of salmonellosis has shown a marked tendency towards growth. While in 1987 the number of cases amounted to 96,244, in 1988 it had increased by 38.51 percent (to 133,312 cases). Over the first four months of the current year there were 41,883 recorded cases of salmonellosis, which is 26.13 percent more than for this same period of 1987.

The problem of salmonellosis is also typical of most of the advanced countries. For example, in West Germany, there are as many as 40,000 recorded cases per year, on average, which represents around half of all intestinal infections in the country. The economic losses caused by salmonellosis in the USA are rated at $2 billion per year. In the past 10 years there has been a sixfold increase in the number of such cases. According to the data of laboratory investigations, more than 50 percent of slaughtered chickens in Canada are infected with salmonellosis, as a consequence of which the costs of treatment of this illness are reckoned at $300 million per year. The economic losses in our country are more than 30 million rubles.

The disease is transmitted through various food products infected with the pathogen.

Thus, in the 1960s and 1970s, 70-85 percent of the cases involving an outbreak of salmonellosis transmitted in food were caused by meat and meat products in our country, most of the time involving an infraction of the rules for processing of the meat of animals that had to be killed.

In recent years, there has been a significant rise in the percentage of group illnesses caused by poultry and eggs. Thus, while in Jan-Apr 1988 there were 8 recorded cases of group illnesses involving 939 patients, in the same period of 1989 there were 17 cases involving 1,331 patients. The spread of the infection in regions with an unfavorable incidence pattern is fostered by the fact that the products of many poultry factories are infected with salmonella. The salmonellosis pathogen is isolated from samples of poultry meat, eggs, powdered eggs, and meals prepared in violation of the rules and not receiving sufficient heat treatment. The most frequent source of salmonellosis has been foodstuffs containing hen's eggs in the recipe (such as pastry and pies with egg cream).

In the Pavlovsk rayon of Ulyanovsk oblast in May 1989 there was a recorded outbreak involving 286 patients, of which 144 were children. The source of the outbreak was pastry and pies with cream, contaminated in the process of preparation.

Therefore, one of the steps being taken by the public health authorities is the prohibition of preparation of foodstuffs which contain raw eggs (ice cream, pastry with cream, eggnog and the like).

Is this a new disease? No. Salmonellosis has become so widespread in connection with the fact that the relative amount of poultry and eggs has increased in the human diet (due to their easy digestibility), and especially because the veterinary and sanitary-hygiene norms and rules are not being adhered to at the poultry factories, cafeterias, and business establishments.

This in no way means that we should forego consumption of these foodstuffs. It has been clearly established that observance of the production and storage procedural norms and the conditions for production and processing of the products of the poultry factories guarantees avoidance of salmonellosis contamination.

It should be emphasized that salmonella may survive in eggs as long as 13 months. Since the reproduction of salmonella is completely halted at temperatures below +5°C, eggs must be kept in the refrigerator. Salmonella is resistant to the action of high temperatures. In the cooking process, salmonella is killed if heated at +60°C for 5-10 minutes; it is killed instantly in boiling. Salmonella in the egg is killed when the egg is "hard boiled."

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